



SATURDAY, SEPTEMBER 21, 1872.

Railroad Car Brake.

The improved brake illustrated in our engravings is more especially adapted for use on four-wheeled coal cars, or such ore cars as are generally used about furnaces, though it admits of various modifications of its arrangements which would adapt it to other forms of car, without altering the principle involved.

It was invented to supply a case of necessity. In January, 1871, a gravity road was built in New Jersey, for the purpose of carrying iron ore from the mines to the Delaware, Lackawanna & Western Railroad. This gravity road was between 2 and 5 miles long, having a uniform grade of 200 feet to the mile, with no level places on which to brake up a train. The cars used would weigh about 5 tons when loaded, and were equipped with the ordinary lever brakes, such as are used on many of the four-wheel coal cars. In less than a month every car "got away" from the brakemen, ran to the bottom of the grade, and there smashed up. It was found unsafe to let two men go down the grade, with a train of only five cars.

In the February following, one of these screw brakes was applied to a car, and this car was kept at the front end of the train, as a guard to the others. With this single brake it was found possible to stop the train of five cars whenever and wherever it was desired. This one brake did all the braking for these five cars until the following July, when the other four cars were similarly equipped, since which time the railroad company introduced this brake on all (30) of their cars, and they have yet to report the first accident or runaway occurring through fault of the brakes. A boy fifteen years of age manages any number of cars with the greatest ease and safety. Brake No. 1 has been in constant use from the time it was first applied (February 6, 1871) until the present time, and as yet shows no appreciable wear.

It will be seen from the woodcut that there is nothing about this brake that can be bent, wrenched, strained or broken. Every part pulls, or pushes, direct.

The screw is made of such a length that it can be run down until the shoes are entirely worn out.

It costs about \$3 a year to keep these 30 brakes in order.

Fig. 1 represents a coal car with the brake applied to one pair of wheels. Only the upright shaft and hand wheel are shown in the engraving, the other portions of the brake being indicated by dotted lines. Fig. 2 shows the side frame of the car, in section, with the brake attached. At A are shown the brake blocks, which are made of wood or other suitable material. These are attached to a flexible iron strap, B, the ends of which are secured to the frame of the car by the nuts and screws shown at C. This strap is about three inches wide and a quarter of an inch thick. D is a vertical brake rod which is operated by the wheel seen in Fig. 1. On the lower part of the brake rod is a screw which works in the nut, E, attached to the frame of the car, and on its extreme end is the block, F, which has a groove lengthwise through which the strap passes. It is kept from falling out by a pin. The end of the brake rod works in a socket in the block in such a manner as to raise or depress the block without turning it. When it is desired to apply the brakes the rod is screwed down by means of the wheel, and the strap is carried down with it. This brings the blocks, A, in contact with the wheels of the car and throws part of the weight of the car upon the brakes. The amount of pressure applied to the brake block by the brakeman is dependent upon the pitch of the screw on the rod, D, and upon the diameter of its wheel. When the brake is not in use, the rod, strap, and brake blocks are elevated sufficiently to relieve the wheels of all restraint. Should the strap stretch, it may be easily brought to the proper tension again by tightening the nuts at C.

It will be noticed that the brake blocks are applied directly on the top of the wheels, which prevents the strain coming upon the boxes as it does when they are placed in any other position. For further information the inventor and patentee, Frederick A. Canfield, of Dover, N. J., should be addressed. Patented Jan 9, 1872.—*Engineering & Mining Journal*.

The Whistle Nuisance.

A correspondent of the New York Evening Post writes as follows:

"The country is covered with a network of railroads. The cars run by a multitude of houses. In these houses—it might be well enough to say are people who have cars—but in these houses, take the country through, are many persons who are ill and suffering, ill with nervous diseases, in delicate and perhaps critical situations, where rest or sleep, it may be, is the only chance of life. And now come by, every hour or two, these railroad whistles, making the most nerve-racking, the most horrible noise heard on earth. Thunder is music to it; the cotton factory as the buzzing of flies in comparison. It is the most distracting, ear-splitting, anger-provoking shriek ever heard out of Bedlam. If the engineers were demons sent to torment us they could hardly do it more effectually.

Is this necessary? Not in the least. The whistles need not be blown so loudly. By some of the engineers they are not; while others "put on steam," and make such a noise as nothing but steam can make. But this is not the point. The whistles can be pitched in a lower key. On the North River Railroad they are so, giving little annoyance, and answering all the purpose; no complaint has been made of their failing to give the requisite notice. The whistle might be made to give a low, deep sound instead of that frightful combination of shrieks which now occasion such distress. Is it not possible to call the attention of railroad managers to this subject? If not, the question is submitted whether petitions might not be addressed to our legislatures, asking them to abate this intolerable nuisance. Enact a law that all railroad whistles shall be set in a low key. That could be done, and it would give relief."

Contributions.

PRACTICAL FIELD ENGINEERING.

No. V.

PLOTTING PROFILES—LAYING ON GRADE-LINES—"INKING IN," ETC.

TO THE EDITOR OF THE RAILROAD GAZETTE:

To the young engineer, no matter how thorough his attainments in the mathematics may be, the practical mechanical operations of engineering office-work offer many embarrassments; and, though nothing can be found to answer the place of liberal education and special preparation for the profession, the following plain directions will serve to disclose all that is necessary to be known by the field engineer touching the preparation of a "working profile" from the leveler's field-notes.

In railroad engineering a profile is a representation on paper of a longitudinal section of the proposed work. The main object of profiling is, to place directly before the eye of the engineer an outline of the undulations of the surface of the earth along the exact location, and to show precisely how far above or below this surface the line of the permanent way is situated.

Profile paper is ruled vertically and longitudinally. The

Fig. 1

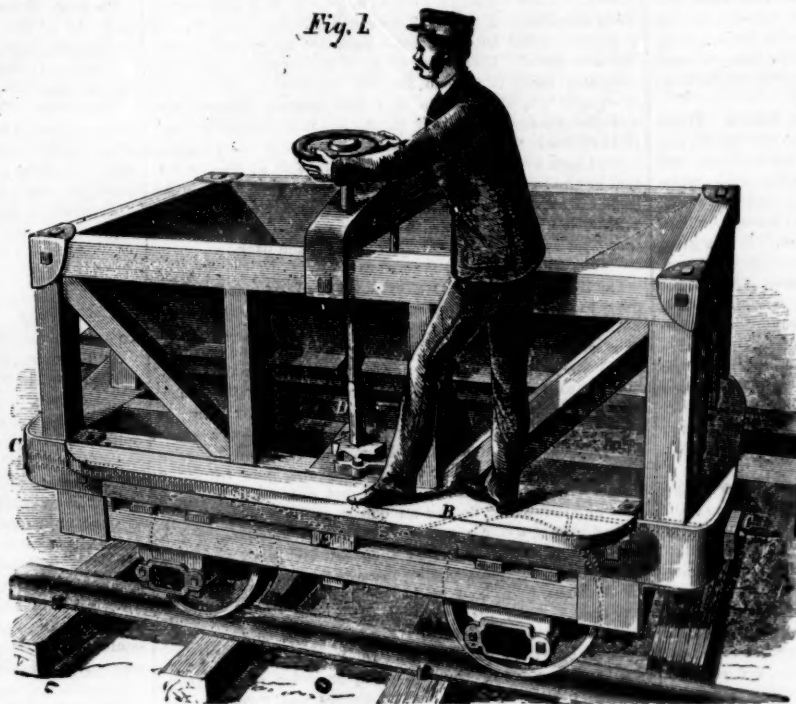
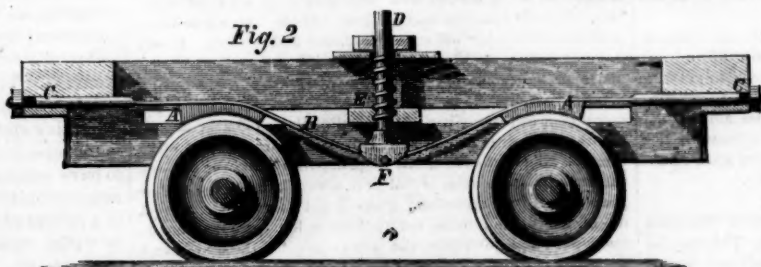


Fig. 2



CANFIELD'S IMPROVED RAILROAD CAR BRAKE.

vertical lines are separated by a distance representing one hundred feet, or one "station." The longitudinal lines are separated by a distance representing one foot. Of the vertical lines, each tenth line is made heavier, and each fifth longitudinal line is distinguished in the same way, and a still heavier impression marks each twenty-fifth longitudinal line.

Now, the first things to be considered before you begin to trace your profile are the highest and lowest points in your line of levels; for from a comparison of these two extremes of elevation you must determine at what point on the paper to begin the trace—a very important thing, since if it is not attended to the elevation or depression of the surface line above or below the commencement point may run you entirely off your paper, where such a thing might easily have been avoided.

Any man having even the most superficial knowledge of the principles of leveling will find no difficulty in simply tracing the elevations of the ground surface on prepared profile paper; but laying on the grade-lines is a matter requiring the exercise of the very best judgment, for this not only settles the amount of earth, timber and stone work to be done on the entire road, but it also involves grave questions affecting the effectiveness of the road in every way, and the cost of equipping it and keeping it up.

What is termed the "grade line" or gradient of any part of a railroad is the line of inclination of the permanent way, and the ratio of inclination may be anything between 0 (representing a level grade) and the maximum adapted on the particular road. It should be an invariable rule in establishing the maximum grade for any line of road, to make it as near zero as the circumstances of the case will permit; but no arbitrary rule will apply.

In crossing the line of another railroad you must cross it at grade, or at least 20 feet above or 20 feet below it.

In crossing a stream your grade line must be above high-water mark and, if the stream is navigable, above the altitude of the crafts used in such navigation, making due allowance for the depth of your bridge below grade.

If the company employing you make it of the first importance that the first cost of the road shall be as little as possible, you must, whenever you can do so and not overstep the established maximum of grade, make the cuttings and embankments balance as nearly as possible. This is a general rule, with some particular exceptions. If, for instance, the cuttings of a certain division of the line are stony or consist of "hard-pan," and the contiguous embankments may be easily scraped up from borrow pits in loose soil, it may be advisable to raise the grade-line, thus lessening the hard cutting and increasing the easily made embankments.

The experience of railroad civil engineers will bear me out in saying that, however acceptable such a thing would be to the engineer, railroad builders rarely ever defer to a judgment not their own, and not infrequently with them the cheapest plan is the best. On account of this it often happens that it is necessary in laying on your grade-line to take into consideration the relative cost of trestle-work and embankment, and decide between the two. It has been ascertained that in the West, where timber is cheap, an embankment 14 feet wide on top and having a slope of 1½ to 1, costs more than trestle-work, after its altitude exceeds 13 feet.

In a level, heavily timbered country, where grubbing is very expensive, it is often best to cut the timber close to the surface and raise the grade-line one and a half or two feet above the stumps.

So, in the case of bog or marsh land that cannot be drained, the grade-line must be raised above the surface sufficiently to give a good permanent way either on embankment or piers.

These cases are mentioned to impress on the mind of the young engineer the necessity of a clear and thoughtful examination of every foot of his line before he attempts to plot a working profile.

Well, having traced the surface elevations and laid on your grade-lines in pencil, you have only to retrace the whole with India ink, and the longitudinal section of your work is accurately represented. The practice of coloring the space between the grade-line and the surface line is of no importance and is not recommended.

All the stream and road crossings, the timbered and open land, the location of culverts, cattle-passes and stock-yards should be appropriately designated on the margins of the profile paper.

The line should be divided on the profile into working sections, generally of not more than a mile in length, and the cubic yards of cutting and embankment of each section should be marked in figures on the margin.

The ratio of each grade-line should be calculated and placed above the line, marked *plus* if a rising grade, and *minus* if a falling grade. Thus if the grade ascends 1 foot in 100 feet, it should be marked +1; if it falls 1 foot in 100 feet, it should be marked -1, etc.

At stream crossings, high-water mark, low-water mark, and the bottom of the stream should be indicated on the profile.

All the letters and figures on a working profile should be in India ink.

The next paper of this series will treat of the best methods of taking levels for cross-sections, the manner of side-staking, and the best method of calculating the cubic contents of earthwork.

HOOSEIER.

AMERICAN AND EUROPEAN RAILROADS.

TO THE EDITOR OF THE RAILROAD GAZETTE:
THE ROAD-BED.

The first thing that an American notices in the European railroads is the greater solidity of the track. This massiveness is, perhaps, more noticeable in England than anywhere else. The bed is an elaborate piece of work, and not merely a temporary embankment thrown up. Bridges are very numerous, because there are very few level crossings. Even farm-roads are carried over or under the track. These bridges and tunnels, as well as their approaches, are of the most substantial stone or brick masonry. The rails, as a general thing, are heavier than with us. The best lines have a complete system of drainage by means of tiles laid under ground along the bed. There are many miles of brick wall to keep up the embankments, and wherever the cuttings are deep or the fillings high, the whole surface is turfed over or covered with grass. I do not recall a single naked cut or embankment from Edinburgh to London, from London to Harwich, from London to Liverpool, or from Dover to London. The grassy slopes add very much to the comfort of the traveler by softening the glare, and by diminishing the dust and reverberation. In England and Scotland, railroads are a pleasant feature in the landscape; with us they are unseemly gashes cut across the face of the country. The Irish roads are an exception, in many

respects, to the other roads of the kingdom. In Switzerland, rugged as the country is, the railroad bed is as complete and finished as in England. No grass is allowed on the track. In Holland and Belgium men hoe and rake the track so that it looks as clean as a garden-walk. As they do not have our unsightly cuttings and fillings, so neither do they have our ugly fences. In Ireland the roadside, like the country, is somewhat ragged; but in England and Scotland the well-kept hedge borders the railroad, as it does the public road and the fields. On the Continent, if there is any enclosure, as is seldom the case, it is a hedge of privet. In Holland the ditch filled with water makes the boundary of the road; in Southern Germany and Switzerland it is done by stones set along the road.

STATIONS.

The stations on the European railroads are, as a class, better and larger than with us. In Ireland the best buildings through the districts are the station houses. While such a thing as a stone house covered with tiles is a rarity in Southern Ireland, all their station houses are of this character. They all have large platform accommodations, and generally the name conspicuously displayed at both ends; and here let me remark, that for the comfort and convenience of the traveler, no other signs should be allowed. In Great Britain, as with us, but not on the Continent, huge glaring handbills or advertising boards are put up at the stations to confuse and mislead the foreigner. Robur, Sapolio, Tarrant, etc., dispute with Scrooby, Mistley and Kelverton for the honor of giving a name to the stopping-place, and you are in danger of getting down the name of some nostrum instead of the name of the station. "O, reform it altogether!"

There is every convenience at their station houses. Ticket offices for first, second and third-class passengers; waiting and refreshment rooms, ditto; water closets conspicuous and generally commodious and clean. At all the European station houses there is a "parcel room" as well as a baggage-room. Here, for a penny or groschen a piece, you can leave your bundles, receiving a check or written ticket for it. It is a great convenience to the native and of priceless value to the foreigner, as many a time he could run out and see the place if he was not burdened in mind and body with his "big box, little box, band-box and bundle." I saw Limerick, Carlsruhe, Oberhausen and I know not how many other places, because I could leave my "luggage" in near and responsible hands. Except in the Union Depot in Cleveland, Ohio, I do not know of another depot where there is a recognized "cloak room," as the English call it. Wouldn't it pay to have such a room connected with each of our stations in the cities and large towns? We pause for an affirmative reply.

Boston has for many years protected the traveler from the raids of hackmen, runners and porters. Something has been done in New York and other places; but there is still room for improvement. In Europe the cab nuisance does not exist. The stations are generally enclosed by a fence, and in the cities by large walls and gates. There the station house is the traveler's castle. It is not only free from hackmen, but also from "loafers," that peculiarly American species of the *genus homo*. It may grate a little on one's feeling of motion and locomotion to take your turn for a cab, as in London and Berlin, but you are sure to be right, and that, for a stranger, is better than to be first out. What one loses in speed is more than made up in the feeling of security.

As a general thing, especially on the Continent, there are no persons on the platform except those whose train is made up, so that it would be almost as difficult for a stranger to get into the wrong train in Europe as it would be with us to get into the right one. Here, everybody is supposed to be able to take care of himself; there, nobody. When you are acquainted and at home, our system is the best perhaps; when you are a stranger and abroad, theirs is the best, unquestionably.

CARS.

The European cars, not even excepting those of Southern Germany and Switzerland, are lighter than ours. This may be one of the reasons why broken axles, heated boxes and broken rails are almost unknown there. The passenger coaches are about 25 feet long, not any wider than ours, and much lower—not above seven feet in the center. There are three compartments or sections to each car. First-class in the middle, second-class at each end, third-class generally by themselves. In Germany there is sometimes a fourth-class. The English and Continental second-class compartments are upholstered with plush (third-class with morocco or oilcloth) and carpeted, and the seats, of which there are only six in each compartment, placed face to face, have arms dividing them. The Irish second-class have seats for eight in each compartment; and the Continental third-class, for ten. The class arrangement has its advantages: there is more room generally; many a mile I had a whole compartment to myself, and still more frequently divided between myself and friend. It is pleasant for companies and acquaintances. It offers privacy and favors exclusiveness. But it is a very expensive arrangement for the railroad companies. It leads to very long trains and these hardly half filled: so that, though their cars are much lighter than ours, it is doubtful whether they carry any less dead-weight than we do. On the Continent the system is run more economically, because there the officials see that as many places as possible are filled. An English "guard" shares the exclusiveness of his countrymen and respects it; but on the Continent sociability is more spontaneous, and travelers are herded more. The compartment system gives a close and confined air to the car. It lacks room and light. The middle seats are not comfortable for seeing or reading; and sitting *vis-a-vis* is as unpleasant under some circumstances as it is pleasant under others. With us, you can choose your *vis-a-vis* company; in England, you can't refuse it. It must be a positive discomfort to many passengers that they are compelled to ride backwards. The smoker is well provided for on all the roads, and the smoking compartments are generally well filled. In the Continental cars there are ash-boxes

provided. Spittoons there are none; chewing is not a reputable or recognized habit, and spitting and putting up one's feet on the opposite seat are peculiarly American. There is no water or water-closet on the train, and, of course, there are no stoves. Every traveler carries a knee-blanket, and, in very cold weather, a bag of warmed sand is furnished on some of the Continental lines. It is a continual wonder to an American how the claims of decency, health and comfort should have been so long overlooked—that the South German and Swiss railroads have just begun to make a sort of provision for this class of wants. Overhead in each section there is generally a sack for parcels, and under the seat one can stow away a carpet-bag or box. The Englishman is a beast of burden when he travels. He has with him a general assortment of domestic comforts. The Continental voyager goes lighter armed. As a class, the Europeans carry much less baggage than Americans, though the Englishman has more parcels. Their "luggage van" is not half as large as our "baggage car"—but they know nothing of our system of baggage-checks: "tis true, 'tis pity; and pity 'tis, 'tis true."

Our style of freight car is found in Holland, Belgium, Prussia, Germany and Switzerland; but in the British Isles the Englishman, true to his marine instincts, stretches a tarpaulin over his "goods train," and in this France follows "perfidious Albion." Their engines are not so large, nor so heavy, nor so finely proportioned, nor so elegantly finished as ours are. As a general thing their driving-wheels are larger and better fitted for speed. Except on some of the German and Swiss railroads, there is no cab for the engineman. He stands in an open box, with an iron or board partition between him and the smoke-stack. This barrier has in it two bull's eyes 8 or 10 inches in diameter and glazed. Sometimes this partition is bent back a foot or so at the top, and that is all the protection he and the stoker (fireman) have. Our effective air-brake is not known there.* The train is slacked by a man who sits in a little cab at the rear, with a top or side-projecting window from which he can command the view front and back.

EMPLOYEES.

The European railroads are better officered than ours. Relatively to their own population, they are a better class of men. Their bearing is always official, and in Prussia particularly their conduct is military in its promptness, order and civility. The politeness of Americans never appears to so much disadvantage as in office—except, of course, political office. The attention of European railroad officers is a constant source of pleasure and comfort to the traveler, especially if he is a stranger and unacquainted with the language. It would seem to require a special Providence to watch over strangers traveling in our country, there is such a rush and crush and such an utter impossibility of finding an officer, and, when you do find him, of getting a civil answer. There is one circumstance that goes a great way to make and keep the European employee civil. He is designated by his dress as an officer. Prussians and Wartenbergers look to be army officers; many of them have been. Their dress is uniform in color, cut and trimming. They all wear caps. The Prussians and Belgians dress in blue; so the English. In Bavaria, I think, drab; but, in every case, the hat-band, or color of the cap, or some other noticeable badge singles out "your man." Because he is "a marked man" he is always on his good behavior. He never forgets that he is an official—one whose business it is to render offices of kindness and civility. If our American roads would carry out what some of them have begun, our traveling community would be better served. It certainly is no disgrace to be a conductor or a baggage-master, and therefore it can be no hardship to oblige these officials, as well as others, to wear a distinctive dress. Take an illustration from life: I go into one of our large depots and inquire of some one in the miscellaneous crowd that always hang about such a place for the baggage-room; when I get there I see a room full of trunks, and inhabited by three or four persons; one is the depot baggage-master, the others are "loafers." I can't tell which is which. I inquire at a venture, and, as it turns out, at my risk; for I address the wrong man, and get laughed at for my mistake. Now I say in such a place there should be no possibility of one's making a mistake, and if the official wore a badge there would be none.

SIGNALS.

There is a hundred-fold less whistling (or, as the *Evening Post* has it, "diabolical screaming") on these roads than on ours, and of course a hundred-fold more ear-comfort. Elizabeth has petitioned against this nuisance, against which all the civilized world has long protested. Don't we Americans blow overmuch? Is so much of it necessary for safety in railroad-riding? Three heart-rending screeches, or "the long roll" for every station, crossing or switch—with ever so many more that one must hear but can't understand, and others for "down brakes," "hard down," "danger ahead," "start," "stop," and, as one sometimes thinks, "to wake the echoes." Weak people, sick people, sleeping people surely have some rights. We hope Elizabeth will be able to stop these "disturbances of the peace." Starting signals in Europe are a bell or a low whistle by the engineer, in answer to the boatswain whistle of "the guard," or the word "right" in England, or *fertig* (ready) in Germany and Switzerland. As there are no cows on their tracks, so there are no cow-catchers on their engines, and no whistling them off. Every level crossing is guarded by a gate and a watchman. The telegraph is in constant use on the Continent for starting and running trains. Every precaution is taken for the safety of the train and its passengers; but much less care is had for the comfort of either the passengers or the employees than is taken with us.

There is no bell-rope or other readily accessible means for communicating with the engineer, should it be necessary. After the passenger is shut in at the station and the key turned on him, he must generally wait till the train stops

* The Westinghouse brake has quite recently been introduced on several roads in England.—EDITOR RAILROAD GAZETTE.

before he sees the conductor—except on the Prussian lines, when occasionally, while the train is in motion, the guard creeps along on the outside and can be communicated with. On some of the English roads there is a cord that is in communication with the engineer, but the directions for using it and the penalties for abusing its use make such a complicated notice that I doubt whether one in fifty of the passengers would know how to proceed if he wished to call the engineer.

On the Belgium express train from Cologne to Paris I found the following arrangement: In each compartment there is a signal-bell enclosed with glass, which, if occasion demand (in the words of the notice to travelers), "is to be broken with the elbow, the string pulled, and the arms to be agitated through the right-hand window."

MISCELLANEOUS.

Fuel.—In Bavaria and Switzerland the roads use coal dust and slack compressed into cubic or cylindrical blocks of 20 or 30 pounds weight. On the line from Augsburg to Lindau they use peat.

Lights.—The engines do not carry a head-light as with us, but instead two lights, one on each buffer of the engine. The compartments are dimly lighted by a petroleum lamp, which is set in the roof, and which cannot be meddled with from the inside.

On many through lines even, the trains run into and then back out of the depot—as at Newcastle, York, Brunswick, Magdeburg, Berne, Lausanne, etc.—an awkward arrangement.

Tickets.—In addition to the date, place and class, each ticket has also the price stamped on it—an excellent addition.

Time-tables.—These are for sale at every railroad station. They are issued monthly, and, besides a map or maps, contain other useful information. They are a convenience to the traveler, very cheap (in England a penny and on the Continent about the same), and yet pay their way to the company.

There are no sleeping-cars in Europe.

SEWICKLEY, PA.

J. B. BITTINGER.

Railroad Accounts.

PITTSBURGH, September 10, 1870.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I see in your paper no correspondence on the subject of railroad accounts—one that is certainly of vast importance to all interested as owners or in the management of railroads.

I have had some little correspondence and interchange of opinion with accounting officers of other lines, and find that there is, so far as I can learn, no two that arrive at results in the same way; and yet we are all striving to accomplish the same ends with four requisites, namely, accuracy, minimum of expense, minimum of labor, and dispatch in making up returns constantly in view; and I have no doubt but what each of us flatters himself into the belief that we have accomplished the desideratum. But have we really done so?

What say the auditors and other accounting officers of railroads to the formation of an association for the purpose of disseminating knowledge on this subject? Do not all admit that some good, at least, would ensue? I pause for a reply.

ALPHA.

[In the very first number of this series of the RAILROAD GAZETTE, we began the publication of a series of articles on railroad accounts by a well-informed officer with ideas and positive convictions, which attracted a good deal of attention. The subject is certainly a most important one, but it is not so easy to secure proper consideration for it in this country, where the proprietors and the operating officers are frequently so far apart. "Alpha" seems to have reference chiefly to the details of the accounts rather than the principles which should lie at the bottom of a system of accounts. The latter was chiefly considered by "Paul Stork," in the series of papers to which we have had reference. Doubtless there is abundant room for improvement in the details by discussion and a comparison of systems, and this the accounting officers can effect by their own action, while they would be powerless, or nearly so, in regard to the powers and scope of their department.—EDITOR RAILROAD GAZETTE.]

Premiums for Good Track—A Report of the Experiments on the Philadelphia & Erie.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The Eastern Division of the Philadelphia & Erie Railroad line has recently been the scene of a somewhat novel contest, an account of which will, I think, prove so interesting and instructive to a majority of the readers of the RAILROAD GAZETTE as to need no apology for its appearance in these columns.

Two years ago the track of this road was, generally, in very poor condition. The iron was badly worn and the ties much decayed. The road had never paid expenses since its completion, some eight (?) years ago, and no experienced railroad man needs to be informed of the difficulty of getting appropriations and material for keeping up the track under such conditions. Last year, however, the books for the first time commenced to show a balance on the right side, and it was determined to commence at once the improvement of the permanent way, and push the work forward as fast as circumstances would permit.

Early last spring Mr. Frank Thomson, the Superintendent of the Eastern Division of the above road, conceived the excellent idea of instituting a competitive trial of skill between the different supervisors and track foremen during the season. This plan has been carried out with so much practical wisdom and such beneficial results as to deserve a somewhat extended notice.

Mr. Thomson's division extends from the eastern terminus of the road, at Sunbury, Pa., to Reno, 92 miles. This dis-

tance comprises two supervisors' divisions, designated as Nos. 5 and 6, and 17 sub-divisions, each comprising about five miles of track.

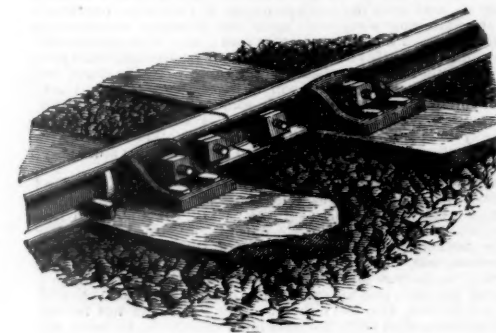
Early in the season a circular was issued to supervisors Nos. 5 and 6, instructing each to choose a mile of track between mile-posts, and to use whatever material and labor were necessary to put it in what he considered first-class condition. When the work was completed, it was to be inspected by a committee composed of the General and Assistant Superintendents, Messrs. W. A. Baldwin and T. N. Ely and Mr. Thomson, for the purpose of deciding which was the best sample of track.

It should be stated that the work was to be done in accordance with certain general specifications laid down by the Engineer of the company, such as the number and distance of the ties, width of ditches, etc.; while the details, such as dressing off the surface of the ballast, etc., were left to the judgment and taste of the competitors.

A sample mile was accordingly put up by each supervisor, and the inspection came off in August. Besides the judges, the track foremen were all present. Every foot of each mile was carefully examined and criticised, and its excellencies and its defects pointed out and commented upon. As might have been expected, it was quite impossible to decide which was absolutely the best mile. Each excelled the other in some points and fell behind it in others, but both were excellent to an unusual degree.

A similar contest was then arranged between the track foremen on each supervisor's division. Each foreman was instructed to choose a mile on his sub-division, and put it up in the best possible condition, under the stimulus of a prize of fifty dollars offered by the company for the best mile in each supervisor's division.

On Tuesday and Wednesday, September 10 and 11, the inspection and award of prizes came off. A special train was provided by Mr. Thomson, consisting of an extemporized observation car, in the shape of a gondola with a tier of benches in front rising one above the other like an old-fashioned country circus. This was pushed in front of the locomotive, and a passenger coach attached in the rear. The sub-division foremen and those interested were seated on the benches, which commanded an excellent view of the track in advance. The first day's business was the examination of the sample track between Williamsport and Renovo, on supervisor's division No. 5, the decision being given by a vote of the foremen of division No. 6, after the inspection was finished. As each sample mile was reached, the train passed over it at a very slow rate, giving all an opportunity to make a critical examination of the work. The countenances of the judges showed that they were fully alive to the importance of the occasion. Every tie and joint and spike underwent a searching investigation, by a score of professional pairs of eyes, and it is safe to say that if there were any weak points they did not remain undiscovered.



The train reached Renovo shortly after noon. The six hours' ride had given all hands an excellent appetite for the dinner which was in readiness at the company's hotel adjoining the station. Half an hour was then spent in going through the well-arranged shops at that point, after which the excursionists returned to Williamsport, where the balloting took place. The votes, after being deposited, were sealed up until the second day's inspection should be completed.

On Wednesday, September 11, the inspection of supervisors division No. 6 was made in the same manner, and voted on by the foremen of No. 5. The utmost pains were taken by Mr. Thomson to insure a perfectly fair and unembarrassed expression of each man's individual judgment. In the course of a few appropriate remarks he expressed an earnest desire that none of the judges should allow any personal consideration to influence their votes, and it is but just to say that, to all appearances, the votes were given in strict accordance with an honest opinion of the real merits of the work. Upon opening and counting the ballots, the prize for division No. 5 was found to be adjudged to John Welch, foreman of sub-division No. 42, near Lock Haven, and that for division No. 6 to William White, of sub-division No. 47, near Montoursville. There were several others whose samples were so little inferior to the above that it must have been a matter of no small difficulty for the judges to decide between them. Edward Phillips had a beautiful mile, through the yard at Williamsport, which was almost absolutely perfect in line and surface. Thomas Lacy's mile, near Whet- ham was remarkable for the careful selection of the joint ties, and the absolute accuracy with which they were spaced. John Considine, of Lock Haven, also put in a sample that must have made rather close work for the judges in their decision. Mark Phillips' section embraced the Linden Bridge, which has been destroyed twice during the season by fire and flood. This made so much business for him that he was not able to do himself justice in the competition, but he has put up some good work nevertheless. In fact, any railroad which averaged as well as the poorest of these samples, throughout its length

would pass muster as A No. 1, without difficulty, in the present state of the art.

The competition appeared to acquiesce cordially in the award of the judges, and very generally expressed their satisfaction therewith. One of the successful ones appeared to have been quite overcome with astonishment, if the expression of his countenance was an adequate index of his feelings.

After the election had taken place, Mr. Thomson presented each foreman with a copy of Huntington's "Roadmaster's Assistant," a work which will afford them a good deal of useful food for reflection during the long winter evenings.

A portion of the sample mile near Muncy, put up by Supervisor Robert Buck, is about as handsome a piece of track as can be found in this country, and some particulars respecting it may be of interest, as it fairly represents the standard to which it is ultimately intended to bring the entire Eastern Division. Supervisor A. G. Brown has a full mile near Whetham, on a straight line, which is almost perfection itself.

Gauge of road, 4 ft. 9 in.; rails, 30 ft. long, 64 lbs. to the yard, fish-jointed; ties, oak, 8 ft. 6 in. long, 7 inches thick, 8 inches face (minimum); joint-ties, 10 inches apart measured between bearing surfaces of rails, and alternating on opposite sides of the track. There are 16 ties under each rail, or 2,816 to the mile. The outer edge of ditches is seven feet from the rail. Ballast of stone finely broken in the track and carried two feet outside the ends of ties. Every joint is provided with stop-chairs, the only contrivance I have ever seen which seems to be effectual in preventing the creeping of the track. Another good point is in the arrangement of the ties under the switch rails. They are placed in pairs, inclosing the tie-rods in a narrow space between, perhaps, three or four inches wide. This prevents their being bent and the track put out of gauge whenever a car happens to get off the rails. A tie is also placed close to the head-block, which relieves it very materially.

The company's engineer has prepared drawings to scale of a section of standard track and a standard switch and frog, which are to be lithographed and furnished to each foreman for his instruction and guidance. On the 12th of November another prize of \$100 is to be awarded to the foreman having the best sub-division on the Eastern Division, the judges to consist of three competent officers in the service of the Pennsylvania Railroad Company. In this contest will be taken into consideration the general advantages and disadvantages in each particular case. Among the advantages will be reckoned the amount of assistance furnished by floating gangs, gravel trains, freedom from slides, etc., while among the disadvantages will be considered the location of the section as regards keeping up the line and surface, some sections being much easier managed in this respect than others. The time required to clear wrecks, slides, etc., will also be taken into account.

The excellent effect of the system of competition which Mr. Thomson has originated, when carried out with such manifest fairness and impartiality, is apparent beyond all question. Before this excursion took place there were foremen who had not been off their sections for a dozen years. They had never seen a specimen of really good track, or in fact any track except their own. There is no education like that of traveling and comparing notes with others. It is safe to say that every one of these men returned home with some new ideas in his head in regard to his business, and a determination to excel or at least equal the samples he had seen during his trip. It is also a wonderful encouragement to the men to have their superintendent go along with them, to inspect their work, to manifest an interest in it, and to talk to them about it. This effect was very marked in the present instance. These foremen were treated like gentlemen, and the infinite pains they took to show that they deserved it was almost amusing, and was in the highest degree creditable to them. Very commonly section-men hardly know the Superintendent by sight. He rides over the road occasionally in a drawing-room car, at the rate of thirty miles an hour. If he strikes in a rough piece of track he "goes for" the supervisor. The latter functionary blows up the section boss, and he passes it along to the hands. As long as everything goes right they never hear from headquarters. Such a system is, to say the least, not conducive to any very exalted degree of enthusiasm on the part of the men.

The result of a single season's work on this plan has been most encouraging. There are few roads in the country the track of which will average, as a whole, much better than the Eastern Division of the Philadelphia & Erie, even now; and I venture to predict that, by the end of another year, the result of this system will be something that all concerned may well be proud of.

F. L. P.

A New Prismoidal Formula.

Solidity of the Prismoid, in Terms of the Sum and Difference of the Center Heights.

Let a represent the side slope, b the base or breadth of road-bed, and c and d the two center heights of a station. Then the end areas will be expressed by

$$ac^2 + bc$$

$$ad^2 + bd$$

while the middle area will be:

$$\frac{a}{4}(c+d)^2 + \frac{b}{2}(c+d) \dots \dots \dots (A)$$

Adding the two former to four times the latter, according to the prismoidal rule, we have:

$$ac^2 + ad^2 + b(c+d) + a(c+d)^2 + 2b(c+d);$$

or,

$$ac^2 + ad^2 + 3b(c+d) + a(c+d)^2,$$

which, divided by 6, gives:

$$\frac{a}{6}c^2 + \frac{a}{6}d^2 + \frac{b}{2}(c+d) + \frac{a}{6}(c+d)^2 \dots \dots \dots (B);$$

which expresses the average cross-section of the station.

It is well known that the average cross-section differs somewhat from the middle area. Let us try to determine exactly how much it differs.

Subtracting the middle area (A) from the average cross-section (B), we have:

$$\frac{a}{6}c^2 + \frac{a}{6}d^2 + \frac{b}{2}(c+d) + \frac{a}{6}(c+d)^2 - \frac{a}{4}(c+d)^2 - \frac{b}{2}(c+d);$$

or,

$$\frac{a}{6}c^2 + \frac{a}{6}d^2 - \frac{a}{12}(c^2 + 2cd + d^2);$$

or,

$$\frac{a}{6}c^2 + \frac{a}{6}d^2 - \frac{a}{12}c^2 - \frac{2acd}{12} - \frac{a}{12}d^2;$$

or,

$$\frac{a}{12}c^2 + \frac{a}{12}d^2 - \frac{2acd}{12};$$

or,

$$\frac{a}{12}(c-d)^2 \dots \dots \dots (C).$$

If now in (A) and (C) we make

$$c+d=s$$

and

$$c-d=z$$

they become:

$$\frac{a}{4}s^2 + \frac{b}{2}s,$$

and

$$\frac{a}{12}z^2;$$

of which the first expresses the middle area of the section, and the second the quantity which must be added to the first to produce the average cross-section.

If we further multiply these expressions by 100 and divide them by 27, they become:

$$\frac{25as^2}{27} + \frac{50bs}{27},$$

and

$$\frac{25az^2}{81}.$$

The sum of which will express the solidity of the station in cubic yards.

For practical use, each must be developed into a table.

Thus, if a slide slope of $1\frac{1}{2}$ to 1, and a road-bed of 20 feet, be required, making $a = \frac{3}{2}$ and $b = 20$, the formulae become:

$$\frac{25}{18}s^2 + \frac{1000s}{27}, \text{ and } \frac{25}{81}z^2.$$

If we now assign to s in the first expression the values, .1, .2, .3, .4, etc., up to any needful extent, say 100 feet, we have a table, of which A, given below, is a small sample.

Assigning to z , in the second expression, like successive values, which need not reach beyond 50 feet, we have a table of which B is a sample.

TABLE A.

ARGUMENT, SUM OF CENTER HEIGHTS.

Feet.	.0	.1	.2
17	1031.0	1039.5	1047.9
18	1116.7	1123.4	1148.1
19	1205.1	1214.1	1228.1

TABLE B.

ARGUMENT, DIFFERENCE OF CENTER HEIGHTS.

Feet.	.0	.1	.2
8	29.6	30.4	31.1
9	37.5	38.3	39.2
10	46.3	47.2	48.2

Now, suppose the center heights of a station to be

$$13.7$$

and

$$4.5$$

$$\text{Sum} = 18.2 \text{ by Table A gives } 1,143.1$$

$$\text{Diff.} = 9.2 \text{ " " B " " } 39.2$$

$$\text{Solidity in cubic yards} = 1,182.3$$

The first table will be different for different bases, but the second is the same for all. Of course both tables will change with a change of side slope, as a is involved in both formulae.

ARCOLA, Ill.

EDMUND FISH.

Track Brakes and Wheel Brakes.

MINNEAPOLIS, Minn., August 23, 1872.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A short time since the writer noticed an article in the GAZETTE, in answer to a correspondent, on the "skidding" of wheels, which gave some ideas that evidently came from a railroad man of practical observation.

Now, I would like to inquire if there are any roads in this country or elsewhere that are using track car brakes in everyday practice; and if so, has it any advantage over the old wheel brake?

Many accidents occur because in the short time after the alarm is given it is impossible to apply the brake to more than one-fourth the number of cars in a long train, which in many cases is insufficient to avert a calamity.

If there is a brake with double the retarding force that can be used on the caboose, and say four or five of the cars, placed at different points in a train, I would like to know it. I would not give a fig for an inventor's opinion; what a railroad man wants is a railroad man's experience.

Yours, constantly in danger,

LOCOMOTIVE.

[We do not know of such a brake as our correspondent inquires about. We were told by the inventor that a track car brake was tested on the Philadelphia & Erie

Railroad, but know nothing of its success. It was illustrated in the GAZETTE of December 2, 1871.—EDITOR RAILROAD GAZETTE.]

"Tangency."

TO THE EDITOR OF THE RAILROAD GAZETTE:

"S. S.," in number for September 7, very correctly brings forward the need of clear notes of field work, and also questions the phrases "point of tangency" and "point of curve." Without going into the question of their very conventional meaning, I will say that I have always used and caused to be used the letters "B. C." and "E. C.," standing for "beginning of curve" and "end of curve," respectively. No ambiguity ever arises from this use, as sometimes does from "P. T." and "T. P.," the latter standing for "turning point" in the level notes.

CHAS. A. SMITH.

Political Economy of Railways.

On Thursday evening, April 4, a paper was read by Mr. Thomas Adams "On the Political Economy of Railways," the point for discussion being "Is Railway Amalgamation conducive to Public Interests?" The chair was taken by Mr. Richard Potter, the President of the Grand Trunk Railway of Canada. The following is an extended account, being lengthy extracts from a full account published in the *Journal of the London Institution*.

The Chairman, in opening the proceedings, announced that letters had been received from Earl Belper, Mr. Allport, General Manager of the Midland; Mr. William Chappess, Captain Fitzmaurice and Captain Tyler, regretting their inability to be present. The subject intended for discussion that evening was the Amalgamation of Railways, which now occupied a good deal of public attention. He was old enough to remember the opening of the first railway, which, as it soon proved a great success, was followed by the production of main trunk lines connecting the various industrial centers of the country. Most of them were opened between 1837 and 1842, and no sooner were they opened than the process of amalgamation commenced. Mr. George Hudson was the first prominent railway man who amalgamated neighboring railways on a large scale, and he was inclined to think that was the greatest service that gentleman ever rendered to the railway interest, particularly the amalgamation of the Midland Counties, the York & North Midland, and the Birmingham & Derby. After the great collapse in railway property in 1846 and 1847 there was a period of rest, and then when railways had somewhat recovered another wave of amalgamation passed over the country, and between 1860 and 1864 there were several very important groups of railway amalgamated, among others the Northeastern and the Great Western. Some few years ago there was an abortive attempt to amalgamate the three railways south of the Thames communicating with the continent of Europe, and since then little had been heard of amalgamation. Now, however, the subject was again coming up consequent on the scheme which had caused so much discussion—the amalgamation between the London & North Western and the Lancashire & Yorkshire. That had been referred to a committee of both Houses of Parliament, and at the present moment there was hardly any subject of greater interest to the commercial world. It had many aspects, some of which were favorable not only to the railway companies but also to the general public. But, on the other hand, there were dangers involved in it which deserved the serious attention of all thinking men. He would reserve any further remarks until after Mr. Adams' paper had been read.

THE POLITICAL ECONOMY OF RAILWAYS.

By Mr. Thomas Adams, Auditor of the Institution.

As the title chosen for the paper about to be read embraces a very wide range, it would be difficult, and I may say impossible, to do justice to the subject in the short time we are allowed this evening. Nevertheless I hope to bring before you a few of the most interesting facts bearing upon the economy of railways. In treating this question I had in view the "Wealth of Nations," the great work of our great teacher, Adam Smith, who says: "Good roads, canals and navigable rivers, by diminishing the expense of carriage, put the remote parts of the country more nearly upon a level with those in the neighborhood of the town; they are the greatest of all improvements." How much more this maxim applies to our railways you can judge. I shall commence by dividing what I have to say under two heads. First, the advantages of railways to the public; and secondly, the advantages, if any, to the proprietors. Now to show the importance of the railway interest of the world, the best idea I can give you, from the best sources, is, that there were in the year 1871, rather more than 131,400 miles open and at work, of which about 66,400 miles were in Europe, and the remainder in other countries. The United States stands for 54,000 miles, and the United Kingdom 15,680 miles. The cost of the latter, according to the Board of Trade returns, was £530,000,000, and although not equal in mileage to the United States, yet the amount of capital cost would be about the same, as there are railways and railways.

The amount expended on railways was in the United Kingdom..... £530,000,000
United States..... 540,000,000
All other countries, 51,000 miles, average £20,000 per mile 1,020,000,000

Total probable cost of all railways..... £2,290,000,000

Now, when we consider the first Railway Act for England was passed in the year 1825, for the Surrey Railway, and that only 52 Acts passed for short and mineral lines, up to the year 1826, the year of the Manchester and Liverpool Act, the opening of this line may be considered a new era in railways; all over the world the progress is wonderful. According to the Royal Commission on Railways' Report, 3,157 Acts were passed up to the end of 1866, and since that year 361 more, making altogether 3,518; no lack of legislation on this head. Let us for a moment look at the advantage of this mode of conveyance. We go to a station, we can book almost anywhere, little thinking of the labor, the capital, the intellect employed in making and working the system that gives us such rapid conveyance for such comparatively trifling sums. Let me cite an example from Adam Smith again, as regards goods. Speaking of the year 1784: "A broad-wheeled wagon, attended by two men drawn by eight horses, in about six weeks' time carries and brings back between London and Edinburgh four tons weight of goods." Now what can we do? If we reckon the cost of this transport at 15s. per day, a very low estimate, the expense would be £31 10s. Now we can carry by railway 250 tons in forty-eight hours, the same distance, at a cost of about £100, or eighty tons in place of four, and in two days, in lieu of six weeks. I do not think I need dilate further on this part of our subject as regards goods; nor is it necessary to dwell upon the history of the coal trade, equally striking though it be. Many of us remember when coal was brought to London by railway the first time. In the year 1871, 4,450,000 tons were carried, enabling the poor to have their coals at a much lower price during the winter. Enough on this part of the subject.

Now, gentlemen, I wish to say a few words on the advantages to passengers. For the last twenty years, I have brought forward, meeting after meeting of the railway companies, the ne-

cessity of encouraging more and more the third-class passenger traffic. When we consider the small actual cost per passenger carried in a full train, the public have not yet had the advantage fully of this economical mode of transit. A train of one thousand passengers can be conveyed, as near as can be calculated, at 2s. 6d. per mile, run so that each passenger costs 1-3rd of a penny per mile, or 33 miles for one penny. Incredible as this appears, it is proved by all the authorities, the only condition being, full both ways, and a sufficient traffic for the line. A great calculator gave evidence before a committee of the House of Commons that coal could be carried at a farthing per ton per mile, and would give then a profit of 50 per cent. I took the trouble to work this out in trains of 250 tons each, allowing fourteen passengers to each ton; if you could pack them like coal they could be conveyed 112 miles for one penny, 1,344 miles for one shilling, and round the world for one pound, say 24,000 miles. We know how cheaply passengers are carried—certainly nothing like this. The Brighton Railway Company take the Volunteers 102 miles for one shilling and sixpence, and no doubt they could take them cheaper if the trains were regularly filled both ways, but the trains go down full and generally return empty. The number of passengers conveyed, according to the Board of Trade returns last year, were 306,000,000 by all the railways of the United Kingdom, of which 176,000,000 were third-class, at an average of only 9d. each; the average of all passengers on the Metropolitan Railway was only 2d.; and on the Brighton line, third-class, 5d. May I venture to suggest a plan for economizing carriages—it consists of having only two kinds—first and second class—when running fast or express, at higher fares, and when running slower and stopping at stations, lower fares to be charged, so that there would be four rates, enabling third or fourth classes to be carried at minimum rates; it appears to me that this plan would be most suitable to the wants of all. When we consider the slow and weary journeys by the old ways, the only means of traveling for the working people formerly, is it not a benefit conferred on them by capitalists seeking their own interest, that they can travel so cheaply and so well? And they ought to be grateful to the ingenuity and invention of those who have devoted their talents and their lives to this great enterprise.

There is another point, before I proceed further, I wish to attract your attention to—the advantage to the State. When railways were first taxed in the year 1832, the amount of duty received was only £234; the next year it rose to £6,131; and the last year for which the return is made up to (1870), the amount was £500,566, besides which income-tax was charged on £18,830,000, at 6d. in the pound would be nearly £500,000; so that nearly one million per annum is contributed by railway companies, besides an enormous sum for local taxes.

One word now upon the great movement that has taken place for increased wages and short time. If all the power that has been created does not relieve the hard workers of the country it would seem to have been created in vain; and there can be no reason why railway officials and workmen of all classes should be excluded from the rise in the value of labor, and from the improved state of the railway revenues, they ought to be the first to be considered; but it is necessary to impress upon all connected with this interest that the only fund out of which this can be done is profit. If profits increase I am quite sure railway proprietors will be quite willing to increase the remuneration of their servants. Competition has not kept down profits so much as useless lines and extensions, and if all connected with railways would insist upon a policy of rest the progress of this great and industrious nation would soon blot out and compensate all the blunders and extravagances of our predecessors.

We must now proceed to the second part:

In order to show that railway proprietors have received the least advantage from all this, I state the following facts: The gross revenue of the railways of the United Kingdom by the latest official returns (1870), and estimating the increase last year at seven per cent., very near the mark, the amount would be for the year 1871 rather more than 48 millions. The average profit, taking the last ten years, was only 4-08 per cent. per annum, or about £4 1s. 6d., of which the original proprietors did not get more than £3, the preference holders and mortgages taking the first bite. In 1866-1867 some large companies paid no dividend, others 5s. up to 21 per cent. Does it not seem very hard that those who have borne the burden should be so ill-requited?

Who can doubt now that the public have the best of it, and that if we could presume there was no useless and unprofitable outlay, they have the oyster and the shareholders the shell?

I have shown that railways have been of immense benefit to the world at large, distributing the comforts and luxuries, more or less, in all countries, to multitudes that could never otherwise obtain them—bringing the iron to the coal, the coal to the line, the merchandise to the ships, and the luxuries from them—food from the most distant regions. Bringing the weary traveler to his home—the physician to his patient, friends to friends. Many a dying parent has received the solace of his children, which without railways would have been utterly impossible. And has science derived no benefit? Let the geologist, the naturalist, the mineralogist, speak. The strata of the earth have been exposed to an extent hitherto unknown. Given impulse to mining and quarrying—architects and engineers have displayed their skill—raised the iron and steel manufactures of this country—enabled us to build those immense ships, furnished with powerful guns, that we sincerely hope we never shall see in use.

With regard to amalgamation, Mr. Adams said: It becomes a question of competition or monopoly. I should be the last man to contend for any monopoly, for England has prospered most materially under the system of competition. I should not contend for one moment that railways should be placed in the hands of the Government, but at the same time I cannot conceive of any other way in which monopoly can be obtained without placing the railway system of the country under the hands of the Board of Trade, or some other Government authority. The first question is whether there ought to be monopoly or competition, but I do not think for one moment that Government could do better in the management of railways than individual companies pursuing their own interest, and trying to extend the trade and commerce of the country. People point to the instance of the post office and to the telegraphs, and it is true no doubt that Government have undertaken the management of these undertakings; but the whole amount of money paid for all the telegraphs was only about seven millions, while the people of this country have invested about 530,000,000 in railways. It strikes one, therefore, at first sight as something ridiculous to suppose that Government could manage such an enormous capital as that, in the same way as it manages the post office and telegraphs.

DISCUSSION.

The Chairman, in proposing a vote of thanks to Mr. Adams, said he did not see the public had any right to share the benefits which railway companies conferred upon themselves by amalgamation, though undoubtedly they had a right to be protected against certain evils that amalgamation might introduce into the railway service. He might say that although he was prominently connected with an English railway some years ago, having been chairman of the Great Western, he was no longer connected with any English railway, all his energies being employed in the management of a railway 3,000 miles away, and therefore he spoke from a neutral and disinterested point of view. Any rude and wholesale attempt simply to reduce the maximum rates and tolls would, in his opinion, be an impolitic course, unfair to the railway companies, and imprudent from a public view, and for this reason: We were probably on the eve

of a large and permanent advance in the rate of wages and cost of material in this country; probably also of a considerable decline in the value of gold, which would, of course, be followed by a rise in the money price of commodities. Therefore, to impose upon a great carrying company a permanent reduction in the maximum tolls which they were empowered to levy, would be an ungenerous and unworthy course; because, having made their bargains years ago, the public had a right to hold them to that bargain, and to say to them, You accepted the construction of these railways upon certain rates, and circumstances may go against you, but we hold you to that. On the other hand, if the public opened that question and now reduced maximum rates, there would be a strong case for the railway companies years hence to come forward and claim to be allowed to increase their maximum rates. Therefore, he thought the rates and tolls should not be interfered with. He thought it would be unwise to attempt anything like a general control exercised by a Government department over the administration of railway companies, unless indeed it was intended as the first step in a process which should end in the ultimate purchase of the railways by the Government, in which case it might be desirable; but in any other view it would be very unwise to give Government larger authority over the railways than they now possessed, simply because it would reduce the responsibility of railway managers and introduce an element of danger and insecurity. With regard to the ultimate absorption of the railways by the State, he was very familiar with the railway systems both in Europe and America. In the latter country he did not think there were now any railways belonging to the Government, though there were formerly, in some of the Southern States, railways belonging to the Government, but they had since been sold to private companies. In Germany, however, there were railways owned and worked by the State, and in Belgium the largest portion of the system belonged to the Government, and was worked by them. Anybody who had traveled through those countries, and who knew the industrial condition of life there, would bear him out, that wherever the State worked the railways they were badly and insufficiently conducted. It might be said that government organization in this country was of a higher type than in Belgium or Germany, but he did not know that the recent experience of some large departments tended to show that in a constitutional country, where every department was open to continual criticism by the House of Commons, and where the heads of departments were changed every two or three years, departmental administration was particularly clever. The analogy of the telegraphs was sometimes quoted, but the first remark upon that was that they were purchased for about seven millions, though the value in the market at the time was about three millions. The present value of railways in the market was about five hundred millions, and upon the same principle if they were purchased by the State they would cost about one thousand two hundred millions, which was rather a large sum; and it seemed to him that, independently of the absorption of railways by the State, and the injury to many districts which were almost brought into life by railway competition, and in some cases by special rates, there were political dangers connected with the owning of railway companies by the State, which were almost conclusive against it. He was afraid of such an enormous amount of patronage being vested in the government.

Mr. Price (chairman of the Midland) begged leave to second the vote of thanks. He said he came to the meeting anxious to hear what might be said on the part of the public on this question of amalgamation. He naturally regarded this matter more particularly from an official point of view, though, as Mirabeau said, "God made him a man before God made him a soldier," so he was an English citizen before he was made a railway director, and his sympathies even now were more with the public than with the railway. Though he was not by any means dissatisfied with the evening's discussion, he must say he was somewhat disappointed, inasmuch as the title announced was the interest of the public in the question of amalgamation; and this had been less touched upon almost than anything else. He had seen something of the select committees in the House of Commons and the mixed committees, and he was bound to say that he never in his life appeared before or attended any committee which seemed to him to show more complete competence for the task placed before it than the committee now dealing with this question of railway amalgamation. There was not one member of the committee who was not an ornament to it, and a master of the subject he was called upon to investigate. He believed it was the general opinion that railways had largely conducted to the prosperity of this country, but still it was perfectly possible they might have been organized upon a better system. They might have been constructed through the agency of the State, as one gentleman had advocated. He doubted very much whether any department of the State would willingly undertake the business, and so far as he had had an opportunity of judging, most of them would wish to decline it. He did not think the State could educate a class of men who would make successful railway managers in this country. Having passed fifty-five years of age, and having seen a good deal of the world, he must say that he would rather be called upon to find six archbishops, six lord chancellors, and six prime ministers than one good railway manager. He knew of no vocation or pursuit in life which called forth so many good qualities or taxed so severely the inventive genius of a man, or which, on the whole, had brought forward a race of men who had done more honor to the country than that of railway managers. It might, perhaps, have been well if, in the early days of railways, the French system had been adopted, of laying out the country into railway systems, inviting the competition of great associations of capitalists for the construction and working of the lines. In that way a more perfect system might have been obtained; but the question was whether that could now be approached by promoting or perfecting amalgamation. His own opinion was strongly in favor of encouraging it, under certain safeguards, but in that way he thought we should get as nearly as possible to the French system. The chairman had given a short history of amalgamations, and had asked in what mode the protection could be derived. It was not his business to answer that question, but he thought, as railways existed at the present time, it might be assumed that the interest of railways and that of the public were the same; if the public did not exactly know what they wanted they had better leave it to the railway companies to fight out their alliances amongst themselves, and there was no doubt that in helping themselves they would at the same time take care of the public.

The vote of thanks having been unanimously passed,

The Chairman, in reply to the question, How would the amalgamations now in progress affect the development and construction of new lines, said that was an important and rather difficult point. Assuming that Mr. Price's suggestion, that these amalgamations would tend to the ultimate grouping of railways in districts according to the French system, then the question of new construction would be one of great difficulty, as it is even now in France, where new lines were forced upon the different companies by the Government. If England were divided into four, five or six district groups, each occupied by one company only, that new construction would in point of fact be stifled.

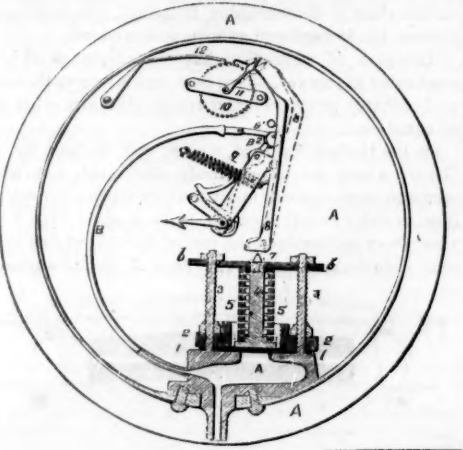
Mr. Bancroft agreed with Mr. Price that the interest of shareholders and the public was identical, and it had been so proved.

The Sioux City (Iowa) Times says that surveys of the line from Yankton to Bonhomme are to be made at once, and grading commenced early in the spring.

Improvement in Registering Steam-Gauges.

This is the invention of Mr. Edward Ashcroft, of Boston, and is thus described in his specifications:

This invention relates to that class of steam-gauges which are intended to indicate at all times the pressure of the steam within the generator to which they are attached, and at the same time to indicate and record any excess of pressure over and above that which the engineer is allowed to carry as a maximum; and it consists in the combination and arrangement of some of the parts of which it is composed, as will be more fully explained hereinafter.



The drawing shows a sectional elevation of the steam-gauge, with the indicating-dial removed for the purpose of showing the operating parts.

In constructing these gauges, I use a case, A, of the form shown in the drawing, or of any other suitable form, it being so constructed that its face can be covered with a dial-plate, upon which figures are formed or placed, so that an indicator point or finger will at all times show to the person in charge the amount of pressure to which each square inch of the surface of the generator is subjected. Within the case A there is placed a reservoir, A', into which the steam is conducted from the generator through a suitable pipe. Extending from the reservoir there is a flattened bent tube or chamber, B, which acts as a spring upon the entrance of the steam into it, its outer end being attached, by means of a link B', to the outer end of a sector-arm, B'', the opposite end of which has teeth formed upon its periphery for the purpose of meshing into a pinion upon the shaft which carries the index-finger or pointer upon the outside of the dial, which at all times enables the attendant to see at a glance the amount of pressure he is carrying. The parts above described are old and well known, they being in general use, and consequently they need not be more particularly described here. The parts hereinafter described are those which form the subject-matter of the present invention, they being used, in combination with those heretofore alluded to, for the purpose of producing the result aimed at. For the purpose of enabling the novel features of this gauge to be added, there is formed in the top of the steam-chamber A an opening, which is covered by a flexible diaphragm, 1, said diaphragm being made of rubber or other suitable material, and held upon the surface of the chamber by means of a cap, 2, and screw-bolts, 3, 3, as shown. Through the center of the cap 2 there is an aperture, which is large enough to admit of the passage of rod 4, which has upon its lower end a flange, the diameter of which is greater than that of the opening in the chamber A, so that when the parts are in the position shown in the drawing no steam can pass from said chamber under the diaphragm. Surrounding the rod 4 there is a spiral spring, 5, the lower end of which rests upon the flange upon the bolt 4, while its upper end rests against a plate or cap, 6, which has upon its lower surface a projection, which enters the spring and holds it in position. The joint between the lower cap 2, the diaphragm 1 and the case A is made by screwing down the lower nuts upon the bolts 3, 3, while the compression of the spring, and consequently the amount of pressure at which the rod 4 and the diaphragm will rise from the seat, are regulated by the nuts upon the outer ends of the bolts 3, 3 acting upon the plate 6, the spring 5 and the rod 4, upon or within which there is a knife-edge, 7, which at certain times presses against the short arm of a bell-crank lever, 8, which is pivoted to the case A near the end of the rod 4. This lever extends from its pivoted point in one direction far enough to allow the knife-edge 7 to press upon its surface when the pressure of steam is sufficient to bring them in contact, and in the other or in a vertical direction far enough to permit a hook which is formed upon its outer reduced end to engage the teeth or notches formed upon the periphery of a wheel, soon to be described. By referring to the drawing it will be seen that the upper or outer end of lever 8 is very much reduced in thickness, in order that it may form a spring and have a hook upon its end, as shown. At some suitable point between the pivotal point of the lever 8 and the upper end there is attached a spring, 9, for the purpose of returning said lever to its original position after it has been operated upon by the knife-edge 7. Near the upper portions of the case A there is affixed a ratchet-wheel, 10, it being so arranged with reference to the lever 8 that the hook upon its upper end will readily engage the teeth upon its periphery, and cause the wheel to partially rotate when the short arm of the lever is raised. This wheel is to be hung upon a shaft, which has its bearings in a frame, 11; or it may be arranged in any other suitable manner which will permit the shaft to rotate with the wheel. Upon that portion of this shaft which protrudes through the dial-plate of the gauge there is affixed an indicator-hand, which, each time the steam has been allowed to attain a pressure greater than the amount prescribed, will, as a consequence, be turned the distance which the action of the hook upon the lever 8 will carry it, the figures being arranged upon the dial to correspond with the movements of said hand or pointer. To prevent the indicator from being turned backward, and thus a false record obtained, a spring, 12, is pivoted to the case A, as shown, its outer end resting upon and engaging with the teeth of the wheel 10, which will at all times prevent a backward movement of such wheel. The arrangements of the parts last described, and their relation to the other parts of the gauge, are such that, while the gauge proper will at all times indicate the pressure of steam in the generator, the parts which constitute the present invention will not be moved from the position in which they are set until the pressure has exceeded the limits prescribed by the proper authority; but so soon as that limit is exceeded the rod 4 will be raised by the pressure upon the diaphragm 5, and the knife-edge 7 upon its upper end will come in contact with the short arm of the bell-crank lever 8, pressing it upward, which will cause its upper end to be moved outward far enough to cause the wheel 10 to be moved sufficiently

to carry the pointer on the end of the shaft to which the said wheel is secured from one figure on the dial to another; and thus the number of times that the excess of pressure has occurred will be accurately recorded; and this record will be continued even though the other parts of the gauge should become entirely inoperative from the breaking or derangement of its parts.

Railroad Employees in England.

We copy below a memorial recently addressed to the board of directors of the Great Eastern Railway Company of England by certain of its employees, relating to increase of pay and decrease of work. It will be interesting as indicating the comparative position of employees of the same grade in this country and England:

The humble memorial of the inspector, passenger guards, goods guards, ticket collectors, signmen, shunters, switchmen, porters and platelayers employed in the London district, sheweth:—That your memorialists are now, and have been for some time past, working an excessive number of hours, which is very detrimental to our physical energy, and denies us the social comforts of our homes, and tends largely to endanger the safety of the traveling public. We, your memorialists, therefore pray, that your honorable board will kindly take these facts into your kind consideration, and grant us relief; and your memorialists further pray that the hours of labor be regulated as per following scale, viz.: That the uniform hours of labor be henceforth reduced to ten hours per day, and that each day stand for itself, except for signmen, shunters and switchmen, whose duties shall be reduced to eight hours per day to those employed at London stations, to Stratford, all boxes inclusive; for all other men between Stratford, Broxbourne and Hertford, Cambridge Line, and Stratford and Chelmsford, Colchester Line, we respectfully ask that they be allowed relief to change their duties from night to day, instead of working eighteen hours as hitherto. Your memorialists also beg for weekly payment of wages; also that all Sunday duties be paid as overtime per hour, according to the different rates of the men employed. Further, your memorialists beg your honorable board to allow them leave of absence, according to length of service, viz.: to all servants who have been in the company's employ over one and under three years, be allowed three days annually; and for those over three years, be allowed seven days annually, and a free pass for themselves and families to any part of the line, such holidays to be paid for to all concerned without distinction. And your memorialists further pray, that your honorable board will at all times entertain such cases of hardship as may arise from unjust and harsh treatment of the intermediate officials; your memorialists claim this right of appeal, preferring to deal with your honorable board, rather than allow such matters to be otherwise ruled. Your memorialists, in the meantime, beg respectfully to submit the following additions to the different rates of wages as at present paid, and they ask this entirely through the advanced prices of provisions, clothing and house rent combined, which render the present rates totally inadequate to the wants of themselves and families. Your memorialists, therefore, most earnestly and respectfully urge your kind attention and consideration to this subject. Yard inspectors, a general rise of 3s. per week; yard foremen, 2s. 6d.; signmen, 3s.; shunters, 3s.; switchmen, 2s.; ticket collectors, 2s.; parcel porters, 2s.; platform porters, 2s.; and London suburban passenger guards, 2s., including all branches; the above advances to commence at once. Your memorialists also beg that henceforth the standard rates of wages shall be as follows, viz.: London and suburban passenger guards, including all branches, 'Head,' start at 26s. per week, and rise 1s. per week per year to 28s. per week. London and suburban passenger guards, 'Under,' start at 23s. per week, and rise 1s. per week per year to 25s. per week. Signalmen employed at the most important junctions between London stations and Stratford to start at 27s. per week, and rise 1s. per week per year to 30s. per week. Signalmen employed at all other boxes to start at 23s. and rise to 25s. Shunters to start at 25s. per week, and rise 1s. per week per year to 28s. per week. Assistant shunters to start at 23s. per week, and rise to 25s. Switchmen to start at 23s. per week, and rise to 25s. Ticket collectors to start at 20s. per week, and rise 2s. 6d. per week per year up to 25s. Parcel porters to start at 22s. per week, and rise to 25s. Platform porters to start at 18s., and rise to 20s. per week. Platelayers respectfully ask a general rise of 3s. per week, and to be allowed to leave work at 3 p. m. on Saturdays, and commence work at 7 a. m. on Mondays. The above rates are confined principally to men employed in the districts from London stations, to Broxbourne and Hertford, Cambridge Line, and Chelmsford, Colchester Line. Your memorialists further respectfully solicit your honorable board will favor them with a reply on or before Saturday, 24th August, 1872. And your memorialists will ever pray, etc.

PERSONAL.

—Mr. Edward Vernon, the originator and editor of the *Travelers' Official Railway Guide*, and formerly General Ticket Agent of the St. Louis, Alton & Terre Haute Railroad, announces in the September number of the *Official Guide* his purpose to retire from the management of that periodical. Mr. Vernon's success in establishing his *Guide* for railroad men will always recognize it as his, whoever may own or manage it—has been in many respects remarkable. He entered the field against the strongest possible opposition, backed by great wealth, and more than all, a prestige which made the success of a new guide extremely difficult. Having very little means to back him, but the general favor of railroad men, he maintained his ground, developed his idea of a proper railroad guide, made the completest and most accurate publication of the kind in the country, if not in the world, and fairly secured a permanent foundation for his guide, almost alone and unaided. This he did by an expenditure of labor and care such as very few men are capable of. Indeed, few men do in six years what he did in two. Having established a guide of extraordinary value, which all railroad men recognized as authoritative, the proprietorship was transferred to a joint-stock company, "The National Railway Publication Company." Mr. Vernon remaining as editor and manager. The value of such a work consists chiefly in its minute accuracy, and Mr. Vernon has not only appreciated this, but has given such labor and pains to the securing of it as most men would be unwilling and all but very few unable to give. Having completed the design and afforded a model for the execution of the work, the labor of his successor will be less; but the Association will be very fortunate if it secures a man who will edit their periodical with the faithfulness and accuracy which Mr. Vernon has displayed in so marked a degree.

—Jonathan Adams, for 50 years past actively engaged as a civil engineer, having superintended the construction of several Southern canals before the days of railroads, and latterly engaged on various railroads in New England and New York, died suddenly of dysentery, at Concord, Mass., on the 6th inst., at the age of 74 years.

—Brevet Brigadier-General Sylvanus Thayer, who was an officer of engineers during the war of 1812, became, we believe, the first Superintendent of the United States Military Academy

at West Point, and was at one time at the head of the Corps of Engineers, U. S. A., died in Great Braintree, Mass., September 7, aged 87 years. He bequeathed property said to be worth \$150,000 to \$200,000 for the establishment of a school in which engineering shall be a specialty, to be located, under certain conditions, either at Braintree, Quincy, or Randolph, Mass.

—Mr. Robert F. Fairlie is one of those to whom medals have been presented which were struck by authority of the Emperor of Russia in commemoration of the construction of the Imperial Livny Narrow-Gauge Railway. Count Bobrinsky, in forwarding the medal to Mr. Fairlie, wrote: "The success of the Livny Railway is, in a large measure, owing to your system of engines and to your careful inspection."

THE SCRAP HEAP.

The Westinghouse Air Brake in England.

We copy the following account of a trial of this valuable and efficient invention from the *London Engineer* of August 16: "Yesterday an official trial of the air brake known by the name of the Westinghouse Air Brake was made on the line of the Southeastern Railway Company. The trial was entirely of a private character, the party being limited to the officials of the company and a few visitors interested in such matters. Among the twenty or so present were the Superintendent of the line, Mr. Mansell, the Superintendent of the Carriage Department, Mr. Cudworth, Mr. Cargill, C. E., Mr. G. Westinghouse, and some of the subordinate railway officials. The ground selected for the trial was that portion of the line lying between Chislehurst and Tunbridge, passing Sevenoaks en route. The object of the trip was to ascertain the time occupied and distance run over by the train at different points of the journey, in connection with the action of the brake. A full description of the mechanical arrangements and application of the brake having already appeared in our columns, we shall confine ourselves on the present occasion to a plain statement of the results elicited at the trial of yesterday's date. After passing Chislehurst the first experiment commenced. The speed was forty miles per hour. After the brake had been on for eighteen seconds the train was brought to a standstill in a distance of 145 yards, with a falling gradient of 1 in 142. When the speed was only thirty miles an hour the train was arrested in fifteen seconds after running, subsequently to the application of the brake, for a distance of 100 yards in a falling gradient of 1 in 120. A third and fourth experiment gave similar successful results. In fact, the velocity attained in the last was rather too much for the equanimity of those who were not accustomed to very rapid railway traveling. Shooting out of a long tunnel at the rate of over sixty miles per hour is a little trying to some people. A brief stay was made at Tunbridge, and the party returned to London early in the afternoon. The Westinghouse air brake is well known in America, where it is extensively employed. Judging from the results of yesterday's trial it ought soon to be well known in this country. Not the least tribute to its merit on the occasion in question was the remarks of those who from their continual practice with the ordinary railway brake could well appreciate the value of the proposed substitute."

Waterproof Glue.

The *Engineer* says: "The liability of glued articles to come to pieces when exposed to the action of water, especially hot water, is familiar to every one. By adding to the water with which the glue is mixed when required for use a small quantity of bichromate of potash, and afterward exposing the part to which it is applied to light, the glue is rendered insoluble, and the articles fastened with it resist the action of water. The proportion of bichromate of potash to be taken must be determined by experiment, but for most purposes one-fiftieth of the amount of glue employed will be sufficient."

St Gothard Tunnel.

M. Favre, the contractor for the great St. Gothard tunnel, is reported to have already prepared a large part of the compressed-air engines and perforating machines which will be employed in the execution of the task. The length of the tunnel has been fixed at nine miles 715 yards. Except for a distance of 483 feet the tunnel will be quite straight. In consequence of the great hardness of the rock through which it will be pierced, it will be scarcely necessary to sustain it by masonry at some points.

Antiquity of Suspension Bridges.

The *Engineer* says: "The most remarkable evidence of the mechanical science and skill of the Chinese so far back as 1500 years ago is to be found in their suspended bridges, the invention of which is assigned to the Han dynasty. According to the concurrent testimony of all their historical and geographical writers, Sang-leang, the commander of the army under Baotsoo, the first of the Hans, undertook and completed the formation of the roads through the mountainous province of Spense, to the west of the capital. Hitherto its lofty hills and deep valleys had rendered the communication difficult and circuitous. With a body of one hundred thousand laborers he cut passages over the mountains, throwing the removed soil into the valleys, and where this was not sufficient to raise the road to the required height he constructed bridges which rested on the pillars or abutments. In another place he conceived and accomplished the daring project of suspending a bridge from one mountain to another across a deep chasm. These bridges, which were called by the Chinese writers, very appropriately, "flying bridges," and represented to be numerous at the present day, are sometimes so high that they cannot be traversed without alarm; one still existing in Spense stretches 400 feet from mountain to mountain, over a chasm of 500 feet. Most of these flying bridges are so wide that four horsemen can ride on them abreast, and balustrades are placed on each side to protect travelers. It is by no means improbable (as M. Panthier suggests), as the missionaries to China made known the fact more than a century ago, that the Chinese had suspended bridges, that the ideas may have been taken from thence for similar construction by European engineers."

Rapid Bridge Building.

We noticed last week that the new iron bridge of the Maine Central Railroad over the Androscoggin at Brunswick was shipped in 40 days from the time the order was given, and erected in 18 days. It will aid in understanding the magnitude of the work to know that it consists of four half-deck spans of 185 feet each. The bridge was built by the Phoenixville Bridge Works, and the contract price was \$56,250.

Soft Soap.

The people in the vicinity of Ladore, Kan., complained that the Missouri, Kansas & Texas Railway trains killed their cattle and that the company wouldn't pay for them; and so, to balance accounts, they abounded the rails for a considerable distance with soft soap. The consequence was that trains were delayed half a day.

Cheap Traveling.

A correspondent at Quincy, Ill., informs us that the competition on the Upper Mississippi between the White Line and Northern Line of packets between St. Louis and St. Paul is such that a passenger is carried from Quincy to St. Paul, 160 miles, for 25 cents, and from Quincy to St. Paul, 625 miles, for a dollar, of course not including meals. At this rate one can ride around the world for forty dollars.



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Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Inventions.—No charge is made for publishing descriptions of what we consider important and interesting improvements in railroad machinery, rolling stock, etc.; but when engravings are necessary the inventor must supply them.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

WARMING AND VENTILATING CARS.

The cool evenings and chilly mornings of the past week must remind those who have the care of passenger cars that fires soon will be, if they are not already, a necessity.

It is not our purpose now to discuss the merits of the different kinds of stoves which are in use, or are offered to railroad companies, but we want to call attention to the means which should be provided in winter for supplying fresh air.

That this subject is somewhat hackneyed, and that many otherwise intelligent people regard the opinions of those who lay so much stress upon the importance of thorough ventilation as a mild kind of hallucination, we know quite well. For the former class we do not now propose to write, excepting to recommend them to read some good treatise on physiology.

In cold weather the chief difficulty encountered in ventilating cars is the discomfort to passengers caused by the admission of a sufficient quantity of fresh air; and therefore car-builders have in nearly all cases provided abundant means for exhausting air, but none for admitting it. Their idea has been, as we heard one of them express it a short time ago, that if the air is exhausted from a car, a corresponding quantity will be sure to find its way in, which is probably true if it is exhausted; but the difficulty of doing so, when there is no provision for allowing an equal amount to enter, did not seem to occur to him. We have repeatedly seen the draft in stoves reversed and the smoke drawn into the cars by the exhaust ventilators at the roof, showing that although air *did* find its way in, when a portion was exhausted, it was very difficult for it to do so. There is nothing more certain than that an amount of air equal to that which is exhausted must be admitted into a car if people are to occupy it; and it should be remembered that with a free admission the exhaust will be very much easier, and *vice versa*. In fact, it will be almost impossible to exhaust the air by the usual appliances if all the apertures of a well-built car are closed. The same is true of the admission of air if the exhaust openings are closed.

We shall, therefore, call attention chiefly to the means which should be provided for supplying or admitting fresh air into cars. To do this in a car filled with people, without making some of them uncomfortable, one of two things must be done—either the air must be distributed

through the car before it reaches the passengers, so that its effects will be imperceptible, or else it must be warmed before it enters. To describe all the plans which have been proposed and used for accomplishing the first of these objects would require much more time and space than we have at our disposal. Such arrangements have been placed in almost every possible position on cars—the sides, the top and bottom. It is only recently, however, that it seems to have occurred to car-builders that the proper locality for ventilators for admitting fresh air is at the front end, and for exhausting it at the back end. The motion of the car facilitates the admission in front and the escape behind; besides, when air is admitted at the front and escapes at the rear, it must traverse the whole length of the car, thus changing all the air in it. For this reason the doors of many cars are now made with a sliding sash, which can be opened either more or less, as may be required. The objection to this is, that the current of air is felt very perceptibly by passengers near the front end of the car. A better arrangement is to put a ventilator over each window, as represented by fig. 1. They can thus be placed higher

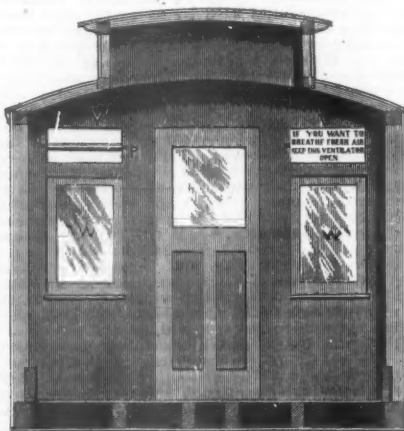


FIG. 1.

up in the car, so that the air which enters is not felt so much as when it is admitted at the door. The corresponding ventilator at the other end of course exhausts the air. When they are made large enough, a car can be very thoroughly ventilated with them without producing uncomfortable drafts of cold air. Some such ventilators which we have seen are, however, quite inadequate for the purpose for which they are intended. As an example, we may cite cars built by the Wason Manufacturing Company, the end ventilators of which are only 7x7 inches. These were covered by a cast-iron guard—the object of which was quite incomprehensible—so that the available area for the admission of air was only about half that of the opening, or 24 square inches. It must be remembered that the supply of air for 56 passengers was expected to enter through this one aperture, as that on the opposite side of the car was enclosed by the closet. As this will always be the case at one end of the car, the ventilators should be made as wide as the windows, and from 10 to 12 inches high.

On the Boston & Albany Railroad, Mr. Chamberlain uses end ventilators similar to those illustrated in fig. 1, the openings of which are closed with small sashes glazed with ground glass. These turn on center pivots, P. He found that they were often neglected and not opened. He therefore painted on each one the inscription shown in our engraving. He says the result is, that whenever they are closed, the passengers very soon open them. The fact is, that comparatively few people who travel understand the operation of ventilators in cars, and many of them are quite indifferent to the want of fresh air. A suggestion, therefore, which indicates to them that a ventilator is intended to be open, reconciles them to having it so, when otherwise they might ride all day in a condition of approximate asphyxiation, without even so much as thinking of opening it.

The advantage of ground glass in the opening is, that it makes an inscription painted on it so very conspicuous to the passengers. Another plan which has some advantages is to close the opening by an ordinary register with slats,



FIG. 2.

as shown in section in fig. 2. By placing a stop under the lever by which the slats are opened, so that they will always stand in an inclined position when open, the current of air which enters will be directed upward

against the roof of the car, as shown by the darts in the engraving. This prevents the cold air from striking the passengers. In cold weather, if the ventilator immediately in front of the stove is opened, the cold air will be carried up over the stove, and so mixed with the heated air as to be quite imperceptible to any of the occupants of the car, unless by the absence of vile odors. The inscription shown in fig. 1 could of course be painted over the register, with perhaps as much good effect as on the ground glass, although it would be less striking. When painted on the glass, if the ventilator is opened, the lettering is hidden, but is displayed as soon as it is closed.

This plan of ventilation has the advantage of being applicable to any car, old or new, and is extremely cheap, and probably produces better results than any other plan of equal cost.

On the Harlem Railroad, a plan was devised by Mr. Garey, which we have already illustrated, but which seems to have so much merit that we reprint our engravings, in order to call attention to it again. Fig. 3 is a view, from the inside of the car, of the end of the raised roof, showing an opening and door, A, the arrangement

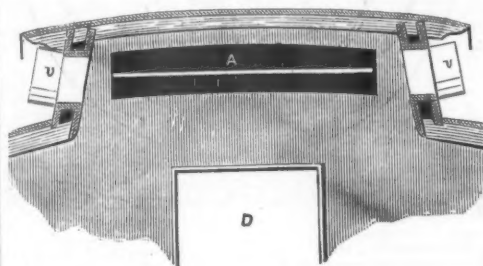


FIG. 3.

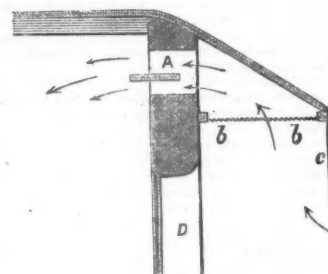


FIG. 4.

of which is more clearly shown in fig. 4, which is a longitudinal section of the same parts, showing also the roof, which extends over the platform of the car. A is an opening over the car door with a sort valve or pivoted door, by which it is closed. bb is wire cloth, which covers the aperture by which the air enters, and is directly above the platform. This is intended to exclude the cinders and dust. C is a sheet-iron apron around the end of the extended roof, also intended to exclude cinders. The air enters as shown by the darts, and is introduced into the car so high up that it is distributed before it becomes perceptible to passengers. This arrangement has been applied to a number of cars, and operates very well. It excludes dust better than when the aperture for admitting air is lower down, and also distributes the air better inside. It cannot, however, be so easily applied to old cars as the end ventilators illustrated in fig. 1, but for new cars it is perhaps the best plan which has thus far been used. The notice to passengers to keep it open should, however, be painted on it in conspicuous letters. We regard this notice to passengers as very important, for the reason that so many people who travel are entirely ignorant of the operation or construction of ventilators. Brakemen who attend the fires find it much less trouble to close the ventilators than to give the stoves the requisite attention, and, unless remonstrated with, will almost invariably close up the cars as nearly hermetically as they can.

Next week we will give some description of the methods of heating cars with warmed air.

REFORMS IN MANAGEMENT.

The discussions and reports of the Western and Southern Railway Association, at the few meetings held hitherto, have made it pretty evident that railroad managers are nearly unanimous in the opinion that there are certain very grave evils almost universal in the management of railroads in this country which should be got rid of at the earliest practicable moment. We can hardly say that the Association has done much else, as yet, than to make this evident. This is a useful result, and probably worth all the effort that the Association has made; but it is not to be denied that many are disappointed because it has done no

more—because it has done so little toward providing a practicable plan—or any plan at all—for abating the evils so universally complained of; and we fear that some of the better class of officers will be less inclined to attend and work in the Association hereafter because of this feeling.

Now, we will not say that the Association has done all it could; that it has been sufficiently bold and decided; but we think that before it is condemned we should reflect a little on the steps toward reform, and also on the organization of the Association.

And first, it need not be argued, we suppose, that before reform is undertaken it is necessary to have an understanding of what constitutes abuses, and of what will be true reform, before we even form a plan for effecting the reform. Now ordinarily this of itself is no light task, the more so as it is necessary to have something like a general agreement before any policy can be enforced in a voluntary association. To active men, accustomed to giving positive orders and doing work with little deliberation, discussions continued from day to day, and from quarterly meeting to quarterly meeting, are apt to be extremely irksome, and to seem extremely fruitless. "It is mere talk," "It is all talk," are expressions commonly heard and spoken in a contemptuous tone. But we maintain that talk is just what is needed—indeed, that it is indispensable, if we are to have action which shall be effective and final. Not only must the proper subjects be selected for action, and the proper action in each case decided upon, but the members of the Association generally must be convinced of this. If half a dozen see clearly certain evils and as clearly effective plans for removing them, the adoption of their views and policies by the Association will not be enough unless the members are made to feel the advisability of the policies as well as prevailed upon to vote for them. The champions of the several reforms must cry aloud and spare not; they must expose evils till all not only acknowledge them, but are eager to abate them, and then when a practical plan for reform is proposed the members will not only vote to adopt it, but take pains to enforce it—a very different thing.

Another reason for the apparent hesitation of the Association in the adoption of decided policies is the lack of power on the part of some of its members. The Association is composed chiefly of presidents and superintendents and other managing officers, whose will, it is popularly supposed, is law on their railroads. But the popular supposition is a mistaken one. The authority granted to a railroad superintendent is rarely or never unlimited, but varies almost infinitely. Some direct almost wholly the operations of all departments of their road; others are little more than ministerial officers, doing simply the work cut out for them according to certain prescribed rules which they may not violate or revise. Presidents even are not always absolute. Not unfrequently an Executive Committee of directors determines the general policies of the road, and the President is little more than their chairman and agent. Indeed, there is a powerful company whose President is reported to be entirely in the hands of one of his board, who enforced against the President's will year after year policies which the latter disapproved. It is evident that whenever the Association has questions to decide demanding union of action, it must leave the adoption of the policies it recommends to the officers first in authority, whoever they may be. Indeed, the adoption and enforcement of new regulations must be left to this class of officers, and unless they attach themselves to the Association, and form as it were the Senate of that railroad congress, its work, it would seem, must be confined chiefly to discussions, inductions from experiences and recommendations.

There are, indeed, two objects distinct in their nature which the Association has in view. Its members meet as business men having necessarily intimate relations with each other, to agree as to what they will do in those matters in which common and united action seems advisable; and again they meet like a body of scientific men to compare experiences and suggest experiments and reforms—in a word, to gain and to give information concerning the art of transportation, by which that business may be improved. In this latter capacity, which we cannot believe to be of minor importance, they are just like an association of engineers. No one may be bound to follow any practice described and recommended any further than he deems best; he uses the knowledge he may gain from the transactions according to his own judgment.

If it should be found, generally or at any one meeting, that the members of the Association have not the power to enforce the policies they would like to adopt, then they should confine themselves to discussions and recommendations. We say again that they will not find these fruitless. We doubt if they can now do any more val-

uable work. Whatever their judgments may be, if fully set forth and explained and adhered to, they will hardly fail of ultimate approval by those who have the power to enforce them. Aside from this the comparatively new business of working railroads is a field for their best efforts, which may result in improvements of vast importance to the property in their care and to the world.

Railroad Earnings in August.

The following table gives the August earnings of twenty-two different railroads, the same number given in our July table and including all the roads contained in that except the Hannibal & St. Joseph; while it gives the earnings of the Rome, Watertown & Ogdensburg, which made no report for July. We give the mileage for each year and also the earnings per mile, which will enable the reader to understand pretty clearly the position of the several roads:

NAME OF ROAD.	RAILROAD EARNINGS FOR AUGUST.		Mileage.	Increase.	P. c.	Earnings.		Increase.	Per cent.	Earn'g per Mile.	
	1871.	1872.				1871.	1872.			1871.	1872.
Atlantic & Great Western.	506	539	33	6 1/2	6 1/2	\$10,606	\$12,100	\$1,494	14	\$311	\$357
Atlantic & Pacific.	332	382	163	15	9 1/2	57,419	67,494	10,075	17 1/2	314	414
Burlington, Cedar Rapids & Minnesota.	291	261	103	6 1/2	6 1/2	67,194	58,421	-8,773	-13	358	338
Central Pacific.	1,013	1,166	153	15 1/2	15 1/2	1,006,373	1,285,297	278,924	27 1/2	1,045	1,093
Chicago & Alton.	511	600	139	17 1/2	17 1/2	573,381	674,363	100,982	17 1/2	681	803
Chicago & North Western.	390	470	81	20 1/2	20 1/2	364,356	430,257	65,901	18 1/2	1,045	1,093
Erie.	173	173	15	0	0	1,253,246	1,253,246	0	0	1,045	1,045
Indianapolis, Bloomington & Western.	173	173	15	0	0	1,253,246	1,253,246	0	0	1,045	1,045
Kansas Pacific.	673	673	108	0	0	332,565	332,565	0	0	1,045	1,045
Lake Shore & Michigan Southern.	1,098	1,098	103	0	0	1,440,873	1,440,873	0	0	1,045	1,045
Milwaukee & St. Paul.	1,121	1,121	103	0	0	565,728	565,728	0	0	1,045	1,045
Marietta & Cincinnati.	254	254	101	0	0	187,341	187,341	0	0	1,045	1,045
Missouri, Kansas & Texas.	447	447	101	0	0	356,460	356,460	0	0	1,045	1,045
Ohio & Mississippi.	371	371	35	0	0	315,000	315,000	0	0	1,045	1,045
St. Louis & Iron Mountain.	325	325	35	0	0	315,000	315,000	0	0	1,045	1,045
St. Louis, Kansas City & Northern.	553	553	35	0	0	315,000	315,000	0	0	1,045	1,045
St. Louis, Alton & Terre Haute.	267	267	10	0	0	171,537	171,537	0	0	1,045	1,045
Toledo, Peoria & Warsaw.	227	227	10	0	0	127,851	127,851	0	0	1,045	1,045
Toledo, Wabash & Western.	688	688	218	0	0	614,176	614,176	0	0	1,045	1,045
Rome, Watertown & Ogdensburg.	218	218	218	0	0	171,130	171,130	0	0	1,045	1,045
Total.	12,471	12,471	963	8 1/2	8 1/2	\$10,300,413	\$12,461,744	\$2,161,331	21 1/2	\$232	\$282
Total increase.								\$2,161,331			

We see that the increase in earnings, which is large, is very nearly the same as the increase in mileage, and this we regard as a very favorable showing. The earnings per mile, it will be seen, are nearly the same for both years, the decrease of four dollars being less than one-half of 1 per cent. Among the roads which show a considerable increase of earnings per mile are the Atlantic & Great Western, 8 per cent.; the Central Pacific, 11 per cent.; the Indianapolis, Bloomington & Western, 25 per cent.; Marietta & Cincinnati, 18 per cent.; Missouri, Kansas & Texas, 38 per cent.; St. Louis & Iron Mountain, 25 per cent.; St. Louis, Kansas City & Northern, 33 1/2 per cent.; Toledo, Peoria & Warsaw, 30 per cent.; Toledo, Wabash & Western, 11 1/2 per cent. As we noticed last month, most of the lines which show large percentages of increase are roads still with small receipts, whose business had not fairly been developed last year. Of those named above, for instance, only the Atlantic & Great Western, the Central Pacific and the Toledo, Wabash & Western have yet reached the average of the roads reported, and the roads with the largest increase have still the smallest earnings per mile.

The roads showing a considerable decrease in earnings per mile are the Burlington, Cedar Rapids & Minnesota, 13 1/2 per cent.; Chicago & Alton, 16 per cent.; Erie, 15 per cent.; Pacific of Missouri, 27 1/2 per cent. In most of these cases, the roads showing the decrease are working this year for the first time a considerable mileage of new road, whose traffic as yet is very light.

International Exhibition at Vienna in 1873.

We confess to some surprise on reading in the European papers which were received during the past week the description of the preparations which have been and are still in progress for this exhibition. There are good grounds for believing that it will not only rival, but surpass, the similar exhibitions at London and Paris in magnitude and splendor.

As probably most of our readers do not know, this exhibition will be opened in Vienna, in 1873, and is thus announced in the "general regulations."

"Under the patronage of His Most Gracious Imperial and Royal Apostolic Majesty, and under the protectorate of His Imperial Highness the Archduke Charles Lewis, the exhibition will take place in the Prater, in buildings erected specially for the purpose, and in the surrounding park and gardens. It will be opened on the 1st of May, 1873, and closed on the 31st of October, of the same year."

Objects will be received for exhibition from the 1st of February to the 15th of April, 1873, inclusive.

The site chosen for the exhibition is in the Imperial Park, called the Prater, on one side of which is the Danube and on the other the canal. The Northern Railway and the Grande Avenue, or Haupt Alle, will give access to the grounds and building.

The building itself will consist of an enormous circular central hall, with a dome 400 feet in diameter, and higher than any similar existing structure in the world. The main building will be 3,000 feet long and 82 feet wide, with thirty-two transepts 347 feet long by 50 feet wide. Besides this main building, there will be separate buildings and sheds for special purposes, which we have not room to describe.

It should be regretted by every American that Congress has not thus far made any appropriation for having our country represented at this exhibition. With the exception of appointing a Commissioner, Mr. Thomas B. Van Buren, we believe no steps have been taken to have our country represented at Vienna. The office and address of the Commissioner are at No. 51 Chambers street, New York. In order to spare him trouble and others disappointment, it will be well for persons who apply to him to remember that no appropriation was made by Congress, and therefore he is without funds to devote to this purpose. It is to be hoped, however, that Congress at the next session will provide the requisite means to have our national industry adequately represented.

Our chief object in writing on this subject is to call the attention of railroad managers and the manufacturers of rolling stock and railroad material to the importance of having our system of rolling stock, machinery and equipment exhibited at Vienna. There certainly is enough wealth among that class of manufacturers to make the expense which would attend such an exhibition a matter of very little importance. It is quite true that it is somewhat doubtful whether there would be any adequate return in money for the trouble and expense involved; but certainly all national pride is not extinct among American railroad managers, and those whose business is identified with their interests.

Probably nothing could be sent from this country which would attract so much attention as a complete American railroad train of passenger cars, with a locomotive and sleeping car attached. Such an exhibition could very easily be made by a combination of several manufacturers. At the same time the separate parts, or at least those which are particularly American, such as our cast-iron wheels, bell-cords, systems of warming and ventilating, the Westinghouse brake, Miller coupler, etc., etc., should be shown independently of the train. A series of models of American bridges, if furnished by the establishments which make the different plans, would also have very great interest. This is especially true of our wooden bridges and other structures of similar character.

It is to be hoped that some of our leading manufacturers will co-operate in this matter, and that an exhibition which will be representative of the present condition of American railroads and their equipment will be made.

Those desiring to exhibit should make application at the earliest possible moment to the American Commissioner, whose address is given above.

Record of Track Increase.

This number of the RAILROAD GAZETTE gives information of the completion of new track as follows:

Boston & Maine, opened for traffic from Portland southeastward to Saco, Me., 13 miles, September 15. Grand Rapids, Newaygo & Lake Shore, track laid from Grand Rapids a little west of north about 30 miles, to a point within three miles of Newaygo, Mich. Northern Central of Michigan, track extended from Albion northward to Eaton Rapids, Mich., 20 miles. Chicago & Northwestern—Madison Extension, a section of track eight miles long has been laid from the junction with the La Crosse line of the Milwaukee & St. Paul eastward to Tunnel No. 3. Winona & St. Peter, extended from the recent terminus westward to Plum Creek, Minn., 18 miles. Burlington, Cedar Rapids & Minnesota—Milwaukee Extension,

track laid from Postville, Iowa, the northern terminus, where junction is made with the Milwaukee & St. Paul, southwestward 11 miles to Clermont. *Arkansas Central* (narrow gauge), extended from the recent terminus 15 miles west of Helena westward 26 miles to a point within six miles of Clarendon, Ark. *International*, extended from Palestine northeast 10 miles to Neches, Texas. *Waco & Northwestern*, extended from Marlin northwest 16 miles to a point within four miles of Waco, Texas. *Indianapolis, Bloomington & Western—Extension*, completed from White Heath westward to Clinton, Ill., about 27 miles. *Northern Pacific*, track extended 55 miles west to Jamestown, at the crossing of the James or Dakota River.

This is a total of 234 miles of new railroad.

THE MEMPHIS & CHARLESTON RAILROAD, with a total of 368 miles of road, including 78 miles of very unproductive branches unconnected with the main line, earned during the last fiscal year, ending June 30, at the rate of \$3,815 per mile. As, however, these branches were not worked the entire year, we will do better to consider the main line and its proper branches, as leased by the Southern Security Company. This property, 290 miles long, earned \$1,370,936.80, which is at the rate of \$4,727 per mile. The working expenses were 67 per cent. The net earnings would have been sufficient to meet the interest on the funded debt and pay a dividend of 3 per cent. on the capital stock, but for sundry "extraordinary expenses" and floating debts, which left a deficit of nearly \$50,000.

The report of cotton shipments shows that the tendency grows less to ship that staple eastward to the Mississippi for shipment either northward or southward. There was a large increase in shipments eastward and a decrease in shipments westward; and while 66,946 bales were carried over the road to Memphis, 89,236 bales were shipped on it from that place. This is probably the general tendency. More and more cotton will be shipped through by rail to the manufactories in the Northeast or to the coast for export; and lines, whether water or rail, which afford pretty direct routes in these directions are likely to carry the cotton. Still, Mobile and New Orleans, and Memphis itself, will doubtless for some time yet continue to attract a large part of the cotton from districts north and east as well as west of them, especially that destined for export; but for a steady traffic, not likely to be diverted by any improvements in transportation, they must look westward.

RAILROAD EMPLOYEES in Great Britain have organized an association called the "Amalgamated Society of Railway Servants," which has sundry members of Parliament and a clergyman among its officers. The objects of the society are advertised to be:

1. To secure ten hours for a fair day's labor.
2. To promote a good understanding between employer and employed.
3. To prevent strikes.
4. Reorganization of Sunday duty.
5. Defence of members.
6. Arbitration for settlement of disputes.
7. Assistance to members.

All of which are objects not to be ashamed of, though of course unjustifiable things might be done or attempted under cover of some of these professed objects. The society also publishes a weekly paper—and not a bad one—entitled *The Railway Service Gazette*, which gives some attention to railroad matters outside of those pertaining to the society and the interests of employees. A memorial of the employees of the Great Eastern Company to the Board of Directors, which gives an insight into what English railroad men consider their grievances, and also the scale of wages which they desire, we publish elsewhere. Considering the fact that these men ask as the highest wages for switchmen 25 shillings a week—equivalent to about seven dollars American currency—for "passenger guards" 28 shillings—less than eight dollars currency—with only 20 shillings for beginners in the lowest employments, the memorialists seem to our American minds, accustomed to American wages, not to demand anything very extravagant.

BUFFALO GRAIN SHIPMENTS for the three-quarters of the year ending with August show a very large percentage to have taken the rail in preference to the water route. The total shipments (including those passing through Buffalo) were 45,671,000 bushels in 1872, against 41,194,000 in 1871, of which 20,207,000 bushels, or 44 per cent., were shipped by rail this year, against 17,286,000, or 42 per cent., in 1871. The receipts by rail are not nearly so small a proportion as might be expected, considering that Buffalo is the great receiving port for grain shipped from the ports of the upper lakes. We cannot give them exactly, as we find lake receipts and receipts by the Grand Trunk Railway (the latter by no means trifling) lumped together. But these latter together amounted, for the nine months of 1872, to 33,602,000 bushels, against 36,889,000 the previous year; while the receipts by the Lake Shore & Michigan Southern Railway for the same period were 15,529,000 in 1872 and 12,309,000 in 1871. Thus we see that the Lake Shore road brought 31½ per cent. of the total receipts in 1872, against 25 per cent. in 1871.

These figures would be much more complete if the shipments over Suspension Bridge were included with those to and from Buffalo. These, with those made by way of Pittsburgh, must make the total rail shipments greater than the lake shipments to Buffalo—and the railroads are likely to carry a larger and larger proportion every year, unless such improvements are made in navigation as will enable lake vessels to go through to tide-water.

CONSCIENCE MONEY is reported again, this time from a person who says that he obtained a pass on false pretences on the Des Moines Valley Railroad about three years and a half ago. This man seems to have determined on making full restitution;

for he not only returned the \$3.75 which a ticket would have cost, but enough more to make up the interest on the amount, and that at the rate of 10 per cent. There is yet room.

A "POST-AND-RAIL"-WAY, we may call what a correspondent of *The Engineer* proposes. He would lay a single rail on top of farm fences, and thus make the fence serve the double purpose of a railroad and a division fence or enclosure. He proposes "a sort of turnstile" at the corners of all fields, for the transfer of cars, produce, etc.

Where is the narrow-gauge after this? We hope we are not off-fence-ive.

THE RAILROAD CONDUCTORS NATIONAL ASSOCIATION is to hold its annual meeting in Louisville, October 23, at the call of President Marshall, of the New York Central & Hudson River Railroad.

NEW PUBLICATIONS.

The New York Daily Bulletin, which is entirely devoted to commerce and finance, and has very full and varied reports of the different markets which must be of great value to merchants and others all over the country; and, moreover, discusses commercial and financial subjects with the ability which comes from a knowledge of principles and very full information of facts, has recently been enlarged by four columns and appears in a new dress. It is now a large, nine-column folio, full of the news which is most interesting to merchants, and of the advertisements which are often quite as valuable to them as the news.

Train Accidents in August.

Our record of accidents published last week was seriously defective, there being accidentally omitted from it accounts of no less than ten accidents of which we had information at the time. We give them below:

About the 20th an engineer making a flying switch on the Portsmouth, Saco & Portland Railroad, at South Berwick, Maine, underestimated the power of his Westinghouse brake, and stopped his locomotive long before it had got out of the way of the other part of the train. The two sections came together with a fearful crash, breaking the ends of the cars which met and the platforms of several others. A man standing on the platform of the third car from the end was thrown completely through the window and uncomfortably out and scratched; and one, whose mouth was open presumably, had the end of his tongue cut off between his teeth.

On the night of the 23d a freight train on the Toledo, Peoria & Warsaw Railway ran through an open switch at Crescent, Ill., ditching the engine and eight cars, and badly injuring the engineman.

On the afternoon of the 21th a north-bound passenger train on the Old Colony Railroad struck a worn frog near North Easton, Mass., the brakes having been put on and the speed slackened, and left the track, tearing up the track and forcing the cars from the trucks. A brakeman and a passenger were somewhat hurt.

On the 27th a south-bound passenger train on the Denver Pacific Railway broke down and came near falling through a bridge, 14 miles south of Cheyenne, the middle support of which had been washed away by a sudden flood, produced, it is reported by a waterspout through a channel which is usually dry. The *Denver Times* reporting it says: "The train, fortunately, was running at a slow speed, only seven miles an hour. The engineer, seeing that the bridge was sinking under him, opened the valves, and the engine, bounding ahead, carried the entire train over before the bridge went down, though the hindmost car had to be hauled up hill from the sinking structure. Mr. Gilman, the conductor, upon discovering the situation, and thinking that the whole train must go into the creek, jumped off, followed by S. H. Clark, Assistant General Superintendent of the Union Pacific Railroad, who struck on his side and shoulder, in the bottom of the creek, sixteen feet below the track. His left arm was injured, and perhaps broken."

About daybreak on the morning of the 27th a peach train on the New York Division of the Pennsylvania Railroad halted in Jersey City so as to obstruct the track nearly to a cut with a curve, and the watchman neglected to make a signal, as the rules direct. The Adams express train coming through the cut could not be stopped until it had run into the rear of the other train, crushed through the caboose car and into a car-load of whisky, which latter caught fire and burned up. No one was hurt.

On the 28th, on the Connecticut & Passumpsic Rivers Railroad, a freight train, which had been ordered to wait at a station for the arrival of an excursion train, started on, the conductor, as he says, forgetting the order. It met an excursion train with a terrific crash. The enginemen and firemen jumped from their engines, and only one man was seriously hurt—a fireman—who had his leg crushed.

On the afternoon of the 30th a freight train on the Vermont Central Railroad "met with an accident" above White River Junction, Vt., damaging a quantity of flour which was among the freight and blocking the road for a time. We have no more definite account.

On the 30th a locomotive on the Western Maryland Railroad ran into the rear of a freight train, crushing two cars loaded with pig iron and badly injuring the engine. No one was hurt.

Near midnight on the 30th a locomotive returning without a train from Fitchburg, on the Boston, Clinton & Fitchburg Railroad, met in collision an express freight train at Gates Crossing, Leominster, Mass., demolishing both engines, killing one fireman, and injuring the other and both enginemen. An exchange says: "The engine Marlborough had been sent to Fitchburg with the cars used on Wednesday for an excursion to Rocky Point, B. I., and in returning, the engineer of the

Marlborough thought he had full right of way to South Framingham, and did not think of the night express freight, which leaves South Framingham at 8:50."

On the 31st, as two heavy freight trains were running close together on the Pacific Railroad of Missouri, near Laclede, the rear train ran into the forward one, throwing a number of cars from the track, breaking up some of them and tearing up the track for some distance. No one was hurt.

These ten accidents caused the death of one person and the injury of ten. With these the tabulated statement, according to the nature or cause of the accidents, becomes the following:

Derailment.	
By spreading of track.....	1
By misplaced switches.....	6
By cut-e.....	4
By spreading of rails.....	1
By malicious obstruction.....	2
By misplaced rail (malice).....	1
By washing away of road-bed.....	1
By breaking of tender journal.....	1
By defective switch.....	1
By broken rail.....	3
By broken driving wheel flange.....	1
By broken car-wheel.....	1
By defective rail.....	1
By defective frog.....	1
Unassigned causes.....	7-31
Collisions.	
Rear collisions.....	15
Head collisions.....	9
Crossing collisions.....	1
Unknown.....	1-26
Broken bridges or culverts.....	4
Broken connecting rod.....	1
Unknown.....	1
Total.....	63

And the record for the seven months is as follows:

	No. of Accidents.	Killed.	Injured.
February.....	21	18	128
March.....	37	3	67
April.....	22	18	32
May.....	27	9	33
June.....	44	63	114
July.....	31	35	66
August.....	63	15	49
Totals.....	235	156	489

While this is a shockingly large number of accidents to report, the addition to the number of those injured is agreeably small. Not a few of the accidents have been such as would be likely to be very fatal, but in the month reported there seems to have been a great many fortunate escapes.

General Railroad News.

CHICAGO RAILROAD NEWS.

Illinois Central.

The company reports as follows its earnings for August:

Land Department.		
Acres construction land sold.....	1,409 74	for \$12,460 18
Acres interest fund lands sold.....	40	for 480.00
Acres free lands sold.....	183 89	for 2,158.90
Total sales during the month of August, 1872.....	1,633.63	for \$15,119.08
To which add town lot sales.....		
Total of all.....	1,633.63	for \$15,119.08
Cash collected in August, 1872.....		\$47,198.00

This is a decrease of 10 per cent. in the Illinois earnings, 11 per cent. in the Iowa earnings, and 8½ per cent. in the total earnings.

The new Cincinnati route by way of Kankakee is becoming quite popular. The business is constantly increasing, and is quite satisfactory to the officers of the road. On Tuesday, the 17th inst., a large delegation of pork packers took an excursion down this road to Cincinnati and return.

Chicago, Burlington & Quincy.

A good deal has been said of late about the Sixteenth street crossing belonging to this road, and some foolish as well as wise things have been said in regard to it. People generally forget how much the railroads have really improved the value of their property. It is said that when the railroad company put down the Sixteenth street crossing, a great many years ago, it was done by special proviso inserted in the ordinance to secure its accomplishment. Now some people talk of compelling the company to remove the track. It is probable that the solution of the difficulty will be found to be in the construction of viaducts, for a portion of the cost of which the railroad companies are willing to pay.

Mr. Harris, General Superintendent of this road, has just been appointed General Superintendent of the Quincy, Alton & St. Louis Railroad, also, which indicates that the two roads will be worked in close connection. The line is from Quincy down the Mississippi to Louisiana, 42 miles. Mr. N. D. Munson, who was at the same time Assistant Superintendent of the Burlington road at Quincy, has been General Superintendent of the Quincy, Alton & St. Louis road heretofore, so there isn't likely to be much of a change.

Chicago, Pekin & Southwestern.

Tracklaying is progressing rapidly on this road at both ends; about 50 miles of track are laid, and within 30 days the line will be completed, and through trains be running from Chicago to Pekin.

Chicago, Omaha & St. Joseph.

Work is progressing between Iowa City and Lenox, and the track is to be all laid between these points within about 60 days.

Milk Traffic.

The milk traffic of cities is usually pretty nearly in proportion to their population, and of course Chicago is not likely to equal the larger cities of the country. It is no inconsiderable business, however, as appears by figures recently published showing the number of gallons carried by the different railroads

ach | tions for preventing a snow blockade the coming winter)

been made in a way that promises complete success, the track having been raised in many places (frequently the most effective of all means to prevent obstruction) and new sheds and fences having been constructed where difficulty is apprehended. They condemn a contract between the railroad company and the Wyoming Coal Company as utterly indefensible. They say that with proper management the road will be able to earn enough to meet its first mortgage, and also that guaranteed by the Government.

Columbus & Toledo.

The people of Washington township, in Franklin County, Ohio, on September 9, voted a tax of \$30,000 in aid of this road.

Cincinnati & Terre Haute.

The *Terre Haute Express*, of September 12, says: "The Cincinnati & Terre Haute Railway has been positively located to Bessemer, on the line of the Indianapolis & Vincennes Railroad, five miles northeast of Worthington, and will not go to the latter place at all. The road-bed is ready for the iron to a point six miles this side of Bessemer, and the grading will be completed to the latter place within twenty days. The iron will be put down soon afterward."

Walla Walla & Wallula.

This Oregon railroad, which extends from Wallula, on the Columbia River, some 25 miles west to Walla Walla, and which was being laid with strap rail, has, it is reported, been sold to a party of capitalists who will make it a first-class road.

Texas & Pacific.

A grand mass meeting was held at San Diego, Cal., August 26, to ratify the agreement made with Colonel Scott as to terminal buildings, etc., in that city. The arrangements were generally approved.

Fort Worth, Texas, has voted to donate \$100,000 to the company, provided the machine shops of the main line and Transcontinental Division are located in that town.

New Mail Route.

On the 14th the Post Office Department ordered an extension of the mail service on the Ashtabula & Jamestown Branch (36 miles) of the Lake Shore & Michigan Southern Railway, beginning October 1, at \$1,804 per year.

Continental.

A telegram from Fort Wayne, Ind., dated September 12, says that engineering parties were there making surveys both east and west from that place, that a large force was grading between Tiffin, O., and Fort Wayne, that the grading between Rochester and Rensselaer, Ind., about 50 miles, was then under contract and begun, and that it was expected that the road would be ready for the iron from Tiffin to the Indiana line and from Rochester to Rensselaer by January.

Davenport & St. Paul.

Work is reported to be progressing rapidly. On the 11th 17 car-loads of iron, and on the 12th, 18 were dispatched for the end of the track, and more were to follow daily. Eight or nine car-loads are enough for a mile. The company is constructing a telegraph along its line.

Baltimore & Ohio.

The *Pittsburgh Commercial*, of September 13, says: "During the past week the long contemplated railroad between Connellsville and Wheeling has been put under contract. It had been generally considered that the proposed construction of an air-line road from Pittsburgh to Chicago would so far give the Pittsburgh, Washington & Baltimore Railroad Company a route west that the project of finishing the old Hempfield road would be abandoned. The fact that the contracts are given out shows that such is not the case. The great increase of freight traffic on the Baltimore & Ohio road, and the unexpected delay experienced in obtaining the right of way for the Chicago line, have impelled the immediate construction of this communicating link between the main stem at Wheeling and the Connellsville line east, so that the Baltimore & Ohio road may be relieved of the pressure upon its carrying capacity. The road will be finished as quick as possible, and a considerable amount of rolling stock has already been ordered for it."

"The completion of this road will not prevent the building of the new one to Chicago. As has already been stated, the contracts for that road between Ravenna, Ohio, and Chicago, have been let, and those from that point to Pittsburgh will be given out early next month."

Texas & Pacific.

Texas papers report that the company intend to ask the next Legislature to change the subsidy of \$10,000 per mile for the division of the road known as the Trans-Continental, for a land grant of 24 sections to each mile of road. As the road will run through some of the best land in Texas, this will be a considerable gain to the company.

International.

This road is now complete to Neches, ten miles northeast of Palestine, the late terminus, and 105 miles from Hearne. The first train ran through September 9.

Arkansas Central.

The road is completed to a point about six miles from Clarendon, on White River, and about 40 miles from Helena. It is expected that the track-layers will reach Clarendon in about ten days. Some delay has been caused by the non-arrival of iron at the time promised.

Paducah & Memphis.

The grading on this road is nearly completed from Memphis to the northern line of Shelby County, Tenn., a distance of about 23 miles. A large quantity of iron has been shipped, and is expected shortly to arrive.

New York, West Shore & Chicago.

The President, Attorney and Chief Engineer of this company held a conference with a committee of citizens of Rochester, N. Y., at that place, September 12. The *Rochester Democrat and Chronicle* says: "The business of the conference was, of course, in relation to the location of the road. The line as laid out will pass to the south of us, but the company are willing to deflect the route on certain conditions which were rather intimated than expressly stated last evening. They ask the right of way through the city, grounds for a depot, and a sum of money equal to the cost of the extension of the road required by the deflection. The extension is but six miles and a fraction, and the sum asked is \$600,000. A proposition was made by the citizens present to give half of that amount—the \$300,000 before offered to the Lake Shore road. This plan was not regarded with favor by the officers of the company. The meeting finally broke up without having reached any conclusion. It was agreed to adjourn subject to the call of the committee—or in a few days."

St. Louis & Southeastern.

Winslow & Wilson, the chief contractors, invite proposals for 40,000 cross-ties, to be delivered between Madisonville and Providence, Ky., during the winter, about 2,600 to be delivered on each mile of the road bed. Specifications may be seen at the office of the company in Madisonville.

Davenport & St. Paul.

This company has located its road from the Iowa State line to Rochester, Minn., by way of Spring Valley, Frankford and High Forest, on condition that Spring Valley raise its bonds to

the amount of \$6,000, and High Forest to \$40,000. Proposals have already been invited for constructing the road.

Lake Ontario Shore.

The *Niagara Falls Gazette* says that the contract for grading the road from Lewiston east about five miles has been let to E. V. Root, of Niagara, and the second section, extending to Ransomville, has been taken by a party from Lockport. Charles Stewart, of LaSalle, has the contract from Ransomville east ten miles. This grading is to be finished by June 1, 1879, and work has already been commenced on the first section.

Carbondale & Shawneetown.

The Carbondale (Ill.) *New Era*, of recent date, says: "On Wednesday morning (September 4), Superintendent Hanchett let the contract for building 16½ miles of the extension of the Carbondale & Shawneetown Railroad, from Marion to a point on the Cairo & Vincennes Railroad in Saline County. The road from Marion will run through a comparatively level country, the heaviest grade being but 41 feet to the mile. The route selected is almost on a bee-line from Marion to the Cairo & Vincennes junction, deflecting a trifle only in two or three cases from a straight line. Decker, Hanford & Jones are the contractors, and the entire work will be finished and ready for operation on or before the 1st day of November next. The road will ultimately be extended to the lead and iron regions of Hardin County, and it is believed that in less than two years cars will be running from Carbondale to Elizabethtown, or some other prominent point on the Ohio River. The company has purchased extensive coal privileges on the Crab Orchard Creek, and will proceed to develop them without delay."

Cairo & Vincennes.

The Mt. Carmel (Ill.) *Democrat*, of recent date, says: "The road is now in running order from this city to Carmi. From this city north tracklaying is progressing as rapidly as can possibly be done, and from Vincennes south tracklaying is also being pushed forward rapidly. From Carmi south and from Cairo north hands are busily engaged in tracklaying."

Burlington, Cedar Rapids & Minneapolis.

The Cedar Rapids (Iowa) *Republican*, of September 6, says that the track on the Postville Branch, at the northern end, is now complete from Postville, on the Milwaukee & St. Paul road 26 miles west of McGregor, to Clermont, a distance of 11 miles. Work is also going on on the southern end of the line.

Winona & St. Peter.

The track is now laid to a point two miles beyond Plum Creek, or 56 miles west of New Ulm. The *Winona Republican* reports that the road is to be extended to Lake Campeska, a few miles west of the Big Sioux River, in Nebraska, and 155 miles from New Ulm, this fall. The contract for the road from the State line of Minnesota to the Big Sioux River, 35½ miles, has been let to C. A. DeGraff, the road to be ready for operation by January 1, 1879.

Wisconsin Central.

The Milwaukee *Sentinel* says that this company proposes to run its road from Menasha to Appleton, a distance of five miles, connecting with this road, provided the city will bond itself in the sum of \$50,000 to the Wisconsin Central.

Chicago & Northwestern.

On the Madison Extension eight miles of track has been laid from tunnel No. 3 west to Sparta.

Ionia, Stanton & Northern.

A correspondent of the *Detroit Tribune*, writing from Ionia, Mich., says: "Measures are being taken by the stockholders of the Detroit, Lansing & Lake Michigan Railroad, and the Ionia, Stanton & Northern Railroad, to consolidate the two, the latter to be called the Stanton Division of the Detroit, Lansing & Lake Michigan road. The work is progressing on the Stanton road with great rapidity. Every three-quarter mile section between Ionia and Sheridan is occupied by workmen grading, and the track layers have commenced putting down the iron on this end of the line."

St. Paul & Pacific.

The first passenger train ever in St. Cloud crossed over and ran to the new depot, August 26.

Grand Rapids & Indiana.

The track-layers are already across the Manistee, and it is expected that the track will be laid 30 miles north of Fyfe Lake this season. Several miles of the Traverse City Branch are already completed. The surveying party has passed from the Manistee to the Straits of Mackinaw.

Northern Central, of Michigan.

This road is completed to Eaton Rapids, and trains will begin running very shortly. Eaton Rapids is on the Grand River Valley Division of the Michigan Central Railroad, 24 miles from Jackson.

Grand Rapids, Newaygo & Lake Shore.

Track has been laid to a point three miles from Newaygo, and about 30 miles from Grand Rapids. Trains will begin running at once.

Dakota Southern.

A correspondent writing from Sioux City, Iowa, September 11, says:

"The Dakota Southern Railroad, now under course of construction from this city to Yankton, Dakota, is being pushed forward rapidly. Tracklaying was commenced only a few days since, but they have done three miles up to this date, and will, from this on, lay a mile or more per day. It is the intention of the contractors, Messrs. Wicker, Meckling & Co., of Chicago, to complete the entire road to Yankton, a distance of 65 miles, by the 1st of November, and earlier, if men can be obtained. They have already completed their bridges over the Big Sioux and Vermillion rivers, the only considerable streams they cross, and have ties and bridge timber on the ground for the entire line. Grading is completed about one-third of the distance and under contract for the remainder."

The Sioux City & Pembina, a company recently organized in this city for the purpose of building a line to intersect the Northern Pacific at Breckenridge, Minn., pays one-half of the cost of construction of the Dakota Southern to a point on the Big Sioux River five miles northwest from this city, where a junction will be made, the former road running directly north up the Sioux, and the latter west up the Missouri, both having equal rights on the track to the diverging point."

Boston & Maine.

The cars commenced running from Portland to Saco, on the Maine extension, September 15.

Northern Pacific-Pacific Division.

The Kalama (Washington Territory) *Beacon* says that the track has been laid from the present terminus, 25 miles from Kalama, to the bridge at Pumphreys. The bridge was expected to be ready for the rails by September 10. There is iron enough in the yard at Kalama to lay 38 miles of track, and more is on the road. The machinery for the machine and car shops was daily expected.

Atchison & Nebraska.

The completion of this road to Lincoln, Nebraska, has been celebrated by an excursion from St. Louis to Lincoln, over the Missouri Pacific and Atchison & Nebraska roads, to which many of the prominent business men of St. Louis were invited. The

excursion train left St. Louis on the evening of September 11, and left Lincoln on its return on September 12.

Erie.

Orders have been issued to re-occupy the old repair shops in Paterson, which have been unoccupied for some time. It is understood that the shops which were lately destroyed in Jersey City will not be rebuilt at present. It is most probable that if rebuilt at all they will not occupy the old site, but be located at the west end of the tunnel.

Montclair.

The road across the meadows from Kearney to the junction with the Midland Railroad at Bergen, N. J., is making considerable progress. The bridge over the Hackensack is nearly completed, and piles are being driven for the trestle-work near the junction. From the east end of the Kearney cut to the Hackensack bridge the road will soon be finished.

The proposed branch line from Montclair, through Verona, Caldwell, Whippany and Morristown to Mendham is to be constructed as soon as possible. The right of way over three-quarters of the route has been obtained, and about \$100,000 of the stock has been subscribed.

Iowa Central.

The people of Mankato, Minn., have voted to renew in favor of this company the bonus of \$65,000 for the construction of a line from Mankato to Wells. Nearly all the grading has been done on this line, but the company which was constructing it failed to complete it, and the bonus having been forfeited in consequence, the Iowa Central Company offered to take the road and complete it provided the bonds could be re-voted.

Waco & Northwestern.

This branch of the Houston & Texas Central Railroad, on which trains have been running for some time from Bremond, 143 miles from Houston, northwest to Marlin, about 18 miles, is now complete about 16 miles further to a point about four miles south of Waco.

Texas & New Orleans.

The *Galveston News*, of September 12, says that telegrams have been received by parties in that city to the effect that work has been suspended on the road and the whole corps of Engineers discharged.

Canada, Michigan & Chicago.

This company purposes to construct a railroad from St. Clair, Mich., westward through Ridgeway and Holly to Lansing, 110 miles, on almost identically the line of the projected Michigan Midland, which, however, may perhaps have combined with the former company very lately. The Canada, Michigan & Chicago brought out in the London market in the first week of September an issue of \$2,750,000 first-mortgage 7 per cent. gold bonds. The price, deducting allowances, was about £157 per bond of \$1,000, which is equivalent to about 88½ per cent., currency, of the face. The issue is at the rate of \$25,000 per mile. In the advertisement of the bonds it is said that the company has made a contract with Mr. William Grain, of Toronto, Canada, for the completion of the road by July, 1879. The company's officers and directors are: President, Townsend Cox; Vice-President, Nelson G. Isbell; Treasurer, John B. Harris; Secretary, John V. H. Lott; Chief Engineer, Wilson Crosby. Directors—James F. Clark, Montreal, Canada; George T. Orton, Fergus, Canada; Morton Coates Fisher, London, England; Nelson G. Isbell, John V. H. Lott, Lansing, Michigan; Edward G. Mason, Chicago, Illinois; Townsend Cox, Thomas J. Briggs, Thomas K. Marcy, R. L. Edwards, Edward P. Bigelow, Philip M. Harder, John B. Harris, New York.

The *Detroit Tribune* says: "This company seem to be pushing ahead well. They have great numbers of men and teams at work, and have bought 17 acres of land just south of Ridgeway Station. They have contracted for an engine, 10 construction cars and 500 tons of railroad iron, which are expected at Ridgeway by September 15. Their work at Ridgeway is about done, but at Belle River some very difficult work has to be done in the way of cutting and bridging."

Cannon River.

The preliminary surveys of this line are completed. The lines surveyed run from Red Wing, Minn., by way of Faribault, to Mankato, the shortest line being 87 miles long. It is claimed that the line can be cheaply constructed and with very easy grades.

Chesapeake & Ohio.

We announced last week that this company was offering the unsold balance of its bonds, amounting to \$2,923,700. The awards were made September 17, proposals having been made for \$2,891,500—nearly the whole amount. Those accepted, however, amounted to only \$1,932,500, the price, it is said, averaging about 85 per cent., with interest added. The balance of \$999,000 is offered at private sale.

Boston & Albany.

This company will lay a third track from Springfield east to Indian Orchard, a distance of six miles, early in the spring.

Chillicothe & Brunswick.

This road was sold at auction in St. Louis, September 14, under the second mortgage of \$50,000. The road was sold for \$10,000, and the purchase money paid by Jameson, Cotting & Co., of New York, for the St. Louis, Kansas City & Northern Railway Company. The road extends from Chillicothe to Brunswick, Mo., about 36 miles, and has always been operated by the St. Louis, Kansas City & Northern Company under a temporary lease.

Bedford & Bridgeport.

In order to make somewhat clearer the statements which we have published from time to time of the progress of this road, we give an account of its present condition, from information obtained from the Superintendent, W. H. Brown. The track on the extension from Bridgeport to the State line is all laid with the exception of about two miles from the State line. The superstructure of the bridge over Will's Creek is all framed and ready to raise, and the gap will be closed and trains running through to Mount Savage Junction not later than October 1. From the State line to Kriegerbaum's, on the Cumberland & Pennsylvania road, the track is already laid. From Will's Creek Station, whence a side track is laid to Bridgeport Junction on the Pittsburgh, Washington & Baltimore road, the track runs through the valley of Will's Creek, almost parallel to that of the Pittsburgh, Washington & Baltimore road, and crosses it at a short distance from Kriegerbaum's. The Bedford & Bridgeport Railroad has been leased by the Pennsylvania Railroad Company, and will hereafter be known as the Bedford Division of the Pennsylvania Railroad. The appointment of Mr. W. H. Brown as Superintendent we have already noticed; other appointments are: Horace Diffendure, supervisor; Alfred Fulton, freight agent, and J. G. Miller, ticket agent at Bedford; David Wolf, agent at Wolfburg; G. W. Gump at Napier; Adam Dennis, at Mann's Choice; M. C. Miller, at Buffalo Mills; and Charles C. Irwin, at Bridgeport.

Pennsylvania-New York Division.

The passenger conductors on this road have all been required to give bonds to the amount of \$3,000. This rule does not apply to the conductors alone, as every employee of the company through whose hands money passes is to be required to give bonds to an amount proportioned to the importance of his position.